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EDITORIAL ANNOUNCEMENTS.

THE BRITISH AND EASTERN CONTINENTS edition of the Railroad Gazette is published each Friday at Queen Anne's Chambers, Westminster, London. It consists of most of the reading pages of the Railroad Gazette, together with addition of British and foreign matter, and is issued under the name Railway Gazette.

CONTRIBUTIONS.—Subscribers and others will materially assist in making our news accurate and complete if they will send early information

of events which take place under their observation. Discussions of subjects pertaining to all departments of railroad business by men practically acquainted with them are especially desired.

ADVERTISEMENTS.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our

editorial columns OUR OWN opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

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FRIDAY, JANUARY 25, 1907.

The twelve bills affecting railroads, which are now in the hands of the House committee, ranging from the proposal to enforce a 2-cent passenger fare throughout the United States to the bill requiring the use of the block system, have been diagnosed as a disposition among Congressmen to stop "jumping on the railroads." Like dogs which stop barking because they have forgotten their incentive, the Congressmen are turning up something else. Some of last summer's proposals to further patch the rate law seem to have died of inanition. Most of those now in committee are crude measures. The hours-of-labor law, which has a good purpose, will probably prove to be full of troubles. But there is a bill which ought not to die simply because it is in bad or doubtful company—the bill empowering the Interstate Commerce Commission to investigate accidents. Collisions of a magnitude to alarm the public do not seem to be growing less frequent, and the need of a judicial form of investigation and a determination of their causes is undisputed. The public, competent independent critics, and far-sighted railroad officers ask for this. The correction of those defects in railroad practice which have caused the notable train accidents of the past two years is not in all respects easy, and many of the features of the desired improvement in practice cannot be dealt with by a Government board to any profit; but as a "promoter of publicity" the Federal Government not only has a useful function, in this particular field, but a plain duty. Letting such subjects go over from session to session, because of the exigencies of politics, is a sin.

We print this week the full text of a circular addressed by Mr. W. W. Finley, President of the Southern Railway, to the people served by his road. It is in many ways a remarkable document, not only because it portrays very strikingly the predicament into which a great railroad system can be brought by excess of prosperity—if prosperity is to be measured simply by increase of business—but because it presents in a very graphic manner a number of troubles which are not confined to any special railroad system or section of country. Mr. Finley shows that in eleven years his ton miles have increased over 300 per cent. and his passenger miles over 200 per cent.; that the company has spent nearly \$100,000,000 in providing for these increases; that it is unable to receive

equipment at the contract time, and that improvement work is from five to ten months late owing to the difficulty which contractors are having in getting labor and material. Labor cost has increased from an average of \$1,621.67 per mile in 1905 to \$2,874.71 in 1906, and the increase in labor cost during the last fiscal year alone has been over \$350 per mile of road. The statement that the cost of locomotives has increased from \$11,392 in 1898 to from \$16,000 to \$20,000 in 1906, does not mean anything, because the heavier motive power can and does haul heavier trains, while the average cost of a locomotive was not far from 10 cents a pound in 1898 and 1906 alike. But the figures showing that bridge timber has considerably more than doubled in price in eight years, that the cost of ties has increased from 28 cents to 34½ cents per tie (and Mr. Finley is lucky to get them for that!) and that rails have increased from \$17.75 per ton to \$28 per ton, cannot be gainsaid. Yet these things, bad as they are, do not trouble the President of the Southern Railway so much as does the present marked tendency on the part of many states through which his line passes "to regard any failure of service as wilful and to impose upon the carrier a heavy fine therefor." Here then is the situation. The Southern Railway cannot raise capital, hire men, or get its orders filled, fast enough to meet the demands of traffic, but the communities which the railroad serves refuse to take these facts into account, and see as their remedy only the steady increasing application of penalties to the company which is doing its best. Mr. Finley points out that the logical result of imposing penalties for failure to furnish cars under such circumstances would be simply that the carrier would withdraw facilities from localities where there was no penalty in order to use them in localities where penalties existed, and that this same process carried a step further would simply result in a race between states to see which could inflict the highest penalty so as to obtain a preference for its own citizens. It is noteworthy that at the same time the communities in the South are saying to the railroad companies "You must provide facilities at any cost," the communities in the Northwest are saying to their railroads, "You must raise no more funds!" The state of affairs in the South Atlantic states is surely no more discouraging than this indication that legislative study of railroad economics in Minnesota could get no further, in the year 1906, than the belief that increased capital to enable the Great

Northern Railway to effect much needed extension and improvement work would result in an increased charge to shippers within the state. What is a railroad president to do, when Wall street and the state governments at one and the same time insist that he must not raise new funds, while in the meantime the traffic that he was just able to take care of a few years ago has doubled? We suspect that the answer to this problem, like the answer to many another seemingly unsolvable question, lies along the lines of compromise. Work must be done somehow, and funds must be raised, and state legislatures must be appeased, until the tide turns and allows facilities to catch up with traffic, and until the criticisms of the American people and of the American President take a constructive instead of a destructive form.

THE AMERICAN RAILWAY CLEARING HOUSE AND CAR POOLS.

At the fall meeting of the American Railway Association, as the result of a proposition made by Mr. Stuyvesant Fish, a committee was appointed to inquire into and report on the causes of car shortage and the lessening efficiency of equipment, and to recommend remedies. (*Railroad Gazette*, Nov. 2, 1906.) The specified remedy proposed by Mr. Fish was a freight car clearing house, and the committee, known as the Car Efficiency Committee, was instructed to devise a plan for the formation of such a bureau. Pursuant to these instructions, and stimulated by the recent report of Interstate Commerce Commissioners Lane and Harlan, which was well received and carried considerable weight with the railroads, it was decided that the best way to work out a scheme such as proposed and show its practicability would be by the actual establishment of a clearing house; therefore with the approval of the Executive Committee of the American Railway Association this was undertaken. On January 7 there was held at Chicago a meeting at which were present the presidents of most of the principal lines having headquarters there, and the American Railway Clearing House was formed. It is a voluntary association and is administered at present by an executive committee, of which Mr. Arthur Hale, General Superintendent of Transportation of the Baltimore & Ohio, is Chairman. The other members are: J. Kruttschnitt, of the Harriman Lines; W. A. Gardner, of the Chicago & North-Western; H. I. Miller, of the Chicago & Eastern Illinois, and Daniel Willard, of the Burlington. At the present writing the undertaking has the support of the Atchison, Topeka & Santa Fe; Baltimore & Ohio; Chicago & Alton; Chicago & Eastern Illinois; Chicago & North-Western; Chicago, Burlington & Quincy; Chicago, Milwaukee & St. Paul; Erie; Illinois Central; New York Central; Pennsylvania Lines and the Pennsylvania Railroad, and the Southern Pacific and Union Pacific. Others may be added. Some of these companies will support the movement only to the extent of interchanging statistical information, the functions of the organization being three-fold, namely, collection of statistics, keeping of clearing house records, and formation and administration of a freight car pool.

The most radical and interesting feature of the three will be the car pool, which will be formed by a certain number of the clearing house roads. These cars will be marked with the clearing house name and numbers and will carry the names of the pool members in smaller letters. The pool will be formed under a separate agreement but will be inside the clearing house. Since the creation of such a pool is based on the idea of equal interchange, and therefore presupposes the use of similar cars, plans are being made for three separate pools—a box, a gondola and a coal car pool, each having a separate membership and operated separately from its companion pools, though the methods for each will be alike, of course. The several tasks of the clearing house are each of considerable magnitude, and the initial step in each case will be confined to box cars. To that end the members of the clearing house have been asked to report the number of their box cars on all other foreign lines. Likewise, the box car pool will be the first to be put in commission. The penalty or charge to be imposed when one member of the pool uses more than its share of cars has not yet been established, but the opinion has been expressed that this should be a variable quantity regulated by the traffic activity, the scale to be fixed by the executive committee.

Attention should be directed to the fact that although to the casual observer there is some appearance of complication, of wheels within wheels, in the number and relation of American Railway Association committees that have under consideration matters pertaining to freight car service, these several committees have each the same chairman, Mr. Hale, and also the same secretary, Mr. Allen,

Secretary of the American Railway Association, who also, in all probability, will be the secretary of the clearing house when it is fully organized. Harmonious working is therefore assured.

The Hamilton National Bank, Chicago, has been selected as depository for the clearing house. The headquarters of the American Railway Clearing House, as well as of the Committee on Car Efficiency of the American Railway Association, are at 411 Grand Central Station, Chicago. While the clearing house is at present administered by an executive committee, as mentioned above, it may later be put in charge of the Car Efficiency Committee. Meantime, this committee will continue its work in connection with the reports on surpluses and shortages of cars.

ENGINE FAILURES.

Engine failures are bad things to have at any time. The disturbance to the schedule, the lost time, and the other troubles that ensue, are sufficiently objectionable when operating conditions are normal. Under abnormal conditions they become correspondingly more objectionable. It is therefore unfortunate that it is just these conditions that multiply the frequency of their occurrence. In summer, under normal traffic conditions, engine failures should be few. Winter weather increases them; an unusual volume of traffic increases them; the two combined mean grief in plenty for the locomotive men. Said a master mechanic whose engines are pooled: "In the summer time it's first in and first out; in the winter, first in and right out." When every available engine must thus be kept in service every moment possible, with only such attention at terminals as is absolutely necessary, failures are bound to multiply to an extent measured only by the severity of the conditions and their duration. But by the exercise of suitable measures, even under the adverse conditions mentioned, the number may be kept down to a minimum. The paper of Mr. Dunham, of the North-Western, read at the January meeting of the Western Railway Club, and printed in these columns last week, points out the wisdom of reducing tonnage in times of unusual traffic activity; for, as he says, it means greater speed of trains, more frequent attention to the locomotives, better rest hours for crews, reduced delays waiting at meeting points, and therefore a greater number of cars, and consequently increased tonnage handled in a given time. Another suggestion he makes, which would aid materially in lessening failures, is that no engine should be permitted to start on a trip unless the roundhouse foreman feels pretty sure it is able to make the trip if properly handled and not delayed unreasonably. This would avoid failures of the kind he cites at one point in the paper, where, at the request of the dispatcher, an engine crew will attempt one more trip with the engine before sending it in for repairs, often resulting in a dead engine—the fault really being, as he says, a man failure rather than an engine failure.

The discussion served to emphasize the fact of there being at present no basis whatever by which this feature of locomotive performance—engine failures—can be compared between different roads. The desirability of having standard definition for the term "engine failure" was advocated and the suggestion made that it become the subject for a committee of the Master Mechanics' Association; such committee not only to formulate a definition, but a list of the locomotive characteristics and the numerous varied conditions of operation on which any definition would need to be predicated in order to enable comparisons to be made. At present, when one road reports 5,000 miles per failure and another road 10,000 miles, it is not at all to be inferred that the second road is twice as efficient as the first in this regard; for what one road will call a failure another will disregard entirely; some have no rules at all as to what does and does not constitute a failure, while others have rules formulated which are explicit on all points and which vary in character from liberal to severe. In the absence of such rules, decisions regarding failures usually lie altogether with the dispatcher and records are made up from his reports; for that reason, one master mechanic suggested that dispatchers should have a good working knowledge of the care and handling of a locomotive to enable them to charge failures fairly and justly.

Since "engine failures, like the poor, are always with us," and their minimization is a most important desideratum with all roads, action by the Master Mechanics' Association such as suggested, with such amplification as careful investigation and study by a conscientious committee would develop, would no doubt be productive of valuable and helpful results, and it is to be hoped that the matter will be given early consideration.

EMINENT DOMAIN IN MINORITY SHARES.

Some three years ago (March 25, 1904) in these columns in connection with the case of *Offield versus the New York, New Haven & Hartford Railroad Company*, and at the beginning of the suit we discussed the subject of the legal and equitable rights of railroad corporations to condemn, under eminent domain, the shares of minority holders of the stock of subsidiary lines. The case in question, after plodding its long way through the Connecticut courts and going to the United States Supreme Court on appeal, was decided some time ago by the latter tribunal; and the textual finding of the court is now at hand. In many respects it seems a fundamental decision not only because the case is somewhat unique in itself but because of the principle laid down and the extension of that principle so as to include the vast interests of our railroads at a period in their development when absorption of shares preliminary to consolidation has brought the legal status of the minority shareholder into considerable prominence. As consolidation and centralized control proceeds that prominence of minority interests is not likely to lessen.

The case has been an interesting one. Making the legal narrative as brief here as possible Charles K. Offield, of Chicago, held two shares of the New Haven & Derby Railroad Company, a subsidiary single-track line 17 miles long, leased for 99 years at 4 per cent. on stock by the defendant corporation which owned all the remaining 4,468 shares. Offield asked an exorbitant price—as now recalled, several thousand dollars a share—for his residuary stock. Condemnation proceedings were brought against him in the state courts under a statute passed in 1902 which authorized any Connecticut railroad corporation, after acquiring “more than three-fourths of the capital stock of any steamboat, ferry, bridge, wharf or railroad corporation and not agreeing with the holders of outstanding stock for the purchase of the same” to obtain such minority stock on appraisal after a finding by a superior court judge that the acquirement was in the public interest. After remanding of the case by the United States Circuit Court to the state tribunals they found against Offield. The Supreme Court of the state, all five judges assenting to the opinion written by Judge Baldwin, Professor of American Constitutional Law in Yale Law School, held that “any kind of property can be taken for public use on making just compensation”; that the New Haven & Derby Railroad Company was the mere “ghost of a corporation”; that its merger was essential, physically and financially, to allow the controlling corporation to make improvements that were in the public interest; and that there was no violation of the contract contained in the lease. Judges and courts are but human, at best, and it is not improbable that the undue price asked by Offield for his stock somewhat prejudiced his case.

But it is on the decision of the United States Supreme Court that prime interest rests. Before that tribunal counsel for Offield raised three points: (1) that the stock sought was for private not public use; (2) that the defendant corporation could make the improvements without taking the stock and accomplishing the merger; and (3) that the proceedings and the Connecticut statute violated the due process clause of the federal constitution and impaired Offield's contract rights under the lease. These points the federal court now sweeps away. It declares almost unqualifiedly the power and right of the state to declare and define public uses of property. It rests here upon two decisions both, by singular coincidence, in Utah, and both recent, one being rendered in May, 1905, and the other last February. In the one case the constitutionality is asserted of the Utah law that allows for purposes of irrigation a party to widen a ditch on the property of another, and in the other case eminent domain for a mining company in running a *private* railroad across a resisting party's land. It is true that further reference to the two cases shows that the federal court to some extent limits the ruling to an arid and mountainous mining state of the west and says, in effect, that there may be one law for such a commonwealth and another for an eastern state. But, on the other hand, it calls attention to the extent to which the Utah law goes beyond the Offield case, which “does not need the support of such broad principles.” As to the actual public interest in condemning the two residuary railroad shares the federal judges accept absolutely the findings of the Connecticut court. As regards contract rights of a minority stockholder under the lease the federal court considers the contention only as “parts or incidents of the contention that the stock is sought for a private use,” and, if not so, answered by one of its earlier decisions holding the right of

a municipality to condemn, for public use, after due appraisal a corporation under contract to supply water adding “whatever value the lease gives the shares of stock will be represented in their appraisement.”

Even the eye of the layman can see the fundamental, not to say radical, elements of the decision as applied to minority railroad stock holdings. Under legislation based on the principle of eminent domain the “majority” corporation can coerce the minority share owner, and the finding of the state court as to public interest seems to be final. The public interest may be small or remote without affecting the legal decision. In the New Haven & Derby Railroad case, for example, with the controlling corporation in full possession, save two shares, it is hard to see any practical limitation on improvements, or, if such limitations exist, why they could not have been met by special legislation. Do American railroad companies in such or similar conditions always or even often condemn and merge subsidiary or component lines before they extend or improve? The old theory also that the state's sovereign power of eminent domain, while established should be exercised cautiously and only where the public interest is clear and not remote or inferential seems to be badly jarred.

The situation now may be summed up substantially as follows: In the case of small minority holdings of railroad shareholders as against large majority holdings of a railroad corporation seeking a merger there are, in practice, two dangers. On the one hand the peril of a “strike” by the minority seeking an exorbitant price for its stock and willing to avail itself of its artificial and obstructive vantage; and, on the other hand, the danger of a “freeze-out” by the majority corporation which can be exercised in a variety of ways—an abnormally low lease rate, reduced dividend, diversion of traffic or other starvation and coercive methods applied to the property for which merger is sought. The decision now rendered by the supreme federal judges is distinctly adverse to the minority holder inasmuch as it amplifies the state processes if not powers of condemnation. But throughout the whole litigation and the court rulings bearing on the subject one principle stands firm: The minority stockholder may be deprived of his shares, but it cannot be done without just compensation. His property may be taken but it must be equitably paid for. The future line of rational legislation bearing upon the situation is therefore plain. It should simply aim to perfect the methods of fair and searching appraisal in the condemnation of minority stock with power of appeal to the courts for both sides. On that point the stress of future statute-making should be laid, and, with the agencies of appraisal high in quality, perils to both majority and minority interests if not quite removed will be minimized. If such is the resultant of the rulings of the courts, state and federal, the outcome, on the whole, will be very satisfactory; and, in the present temper of legislatures and the trend of law-making it hardly seems as though the railroad corporations would be unduly favored in the construction of appraisal bodies or anything else.

NEW PUBLICATIONS.

Symmetrical Masonry Arches. By Malverd A. Howe, Professor of Civil Engineering of Rose Polytechnic Institute. New York: John Wiley & Sons. 6 in. by 9 in.; 170 pages; 28 illustrations in the text; 4 folding plates. Cloth, \$2.50.

The book considers not only arches of natural stone, but those of both plain and reinforced concrete, and is intended for use in designing in accordance with the elastic theory. It is not claimed that the formulae and methods presented are rigidly accurate, on account of the uncertain character of the materials that are used; they are, however, sufficiently close approximations to serve the purpose for which they are intended. The greater portion of the book is taken up with the solution of examples in which each step is given in detail, so as to be easily followed. Starting in with the fundamental formula of the elastic arch, it takes up the mathematical consideration of the distortion produced by bending, and the changes in the co-ordinates of the points of the arch by both bending and axial stresses. This is followed by the consideration of the action and stresses of various types of arches that are fixed at their ends, followed by examples of the application of the formulae. The book proper closes with a chapter on typical arches, in which a few typical bridges are illustrated in order to show the method of reinforcement used in the ordinary arch, and this concludes with an abstract from specifications that give an outline of what should be required.

The appendix contains one table of the physical properties of the stone and concrete that are used for building purposes, and a second table giving the general data of about 500 masonry bridges that are located in different portions of the world. The data of this

table include the place, span, rise, material, class and what is of more value still, a reference to a publication where a full description of the bridge can be found.

The Engineering Index. Vol. IV., 1901 to 1905. Published by the Engineering Magazine. Edited by Henry Harrison Supplee and J. Cuntz in cooperation with Charles B. Goling. Cloth, 1,234 pages. Price, \$7.50.

The *Engineering Magazine* for some years has published each month a resume of important articles in the technical press, giving not only short titles, but a three or four line summary of the subject matter as well. The first volume of this index, now out of print, covered articles appearing from 1884 to 1891 inclusive; the second volume, from 1891 to 1895; the third volume from 1896 to 1900, and the fourth volume brings the record up through the close of 1905. It is almost needless to point out that such a compilation is of the highest value for reference purposes, and the *Engineering Magazine* is to be congratulated on its devotion to this task, which must surely be classed as an aid to the scientific professions rather than as a direct source of profit to the publishers. The use of this index, which is well cross-referenced, makes it not only possible but easy to trace and locate papers which one dimly remembers to have read, and which meet a present need better than any other source of information. It is quite true that access to a good technical library is necessary, if the usefulness of such a compilation is to be fully developed, but even where no such library exists, back numbers of periodicals can generally be obtained from the publishers. The important thing is that there should be a permanent record of the exceedingly valuable information which technical journals bring out with increasing diffuseness each year. The *Engineering Index* excellently fills this need.

CONTRIBUTIONS

Canton-Hankow Railroad Equipment.

New York, Jan. 18, 1907.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The photograph you published with the short article on the Canton-Hankow Railroad equipment in your issue of Oct. 12, 1906, may be rather misleading to American railroad men. The cars



A Train on the Canton-Hankow Railroad.

shown in your photograph were ordinary flats covered, and were only used for passengers until the arrival of the first, second and third class coaches from America. I am enclosing you a photograph showing one of the two locomotives built by the American Locomotive Company, to which are attached two third class coaches, one baggage car, one first class and one second class coach, taken near Shui Tong, on the Sam Shui division of the Canton-Hankow Railroad.

P. H. ASHMEAD,
Late Engineer-in-Chief, Canton-Hankow Railway.

The Trouble With Railroad Discipline.

[The following communication, addressed to the Editor of the *Railroad Gazette*, is significant because of the name attached to it, which is that of a trainmaster who has had long experience in dealing with the question on which he writes. His opening paragraphs read as though they might have been written by any one of a hundred space writers who have lately deluged the daily papers with remedies for collisions, but they were not. Mr. Love's article appears to have a very accurate perspective.—EDITOR.]

Many times in the past, as well as just now, there has been much discussion, written and oral, in regard to the dangerous side of American railroad operation, but all efforts to remedy the defects have been spasmodic and the results not what they should have been had persistent effort been made. Much greater results could be obtained if the financial managers of railroads would delegate this part of the work to a capable man and themselves keep entirely out of it. There may be men who are capable of grasping

both the economic and the safety sides of railroad operation in all their details, but they must be very few. Economic administration is mathematical. The largest elements in safe management are psychological. The lines of research and action do not run parallel. Economic administration is an exact science that may be mastered. Safe operation can only follow analysis and deduction with few absolute facts as a basis, and can only be mastered when psychology shall have become an exact science. The assurance with which many men will advocate the most absurd systems, methods or practices as perfectly safe would be ludicrous if the results were not appalling.

If a United States or state commission would thoroughly investigate some of the accidents it might prove beneficial. Where there is a general practice directly in violation of the printed rules of operation which has extended over a long period of time, finally resulting in a collision, is it a sufficient investigation when the person who violated the rule at that particular time admits it and submits to his punishment? Usually the division superintendent makes the investigation. He is judge of the court.

The fact is generally ignored that the division superintendent is often the most interested person present, as the accident is often the direct result of his own action or inaction. If these investigations were actually for the good of the service the very first information desired would be whether this was an isolated case or a general practice. Can railroads ever attain a truly scientific basis of operation unless the investigations are thorough and impartial? This cannot be done until it is fully understood that the division superintendent and the trainmaster are interested parties and debarred from occupying the judge's bench. I do not question the integrity of these officials. The system of investigation is one of the greatest obstacles to putting railroad work on a scientific basis. You do not obtain all the facts. You may adopt every mechanical appliance that has ever been or ever will be invented, but until the human side of the operation is put on a better scientific basis you will be about as far from safety as in the beginning.

This particular science will never be as exact as mathematics, but there is no doubt that it may be far more exact than it is. In the main division officials have gone as far as they could go.

This is a matter directly affecting the directors and owners, for the time is likely to come when the investigation of accidents in this country will be made, as in England, by a government officer who will at once recognize and expose the absurdity of promulgating orders that the ordinary man will not obey, or of neglecting to enforce those that are reasonable. The way to safety will be slow even with this obstacle removed. No general deduction can be made from a single case. It is doubtful if there will be much advance even with many cases to judge from unless there shall be some person with authority whose duty it shall be to analyze, decide and act. Even then it would be useless unless the authority was ample to enforce the corrections without question. In a multitude of counselors there may be much wisdom but there is usually little action.

If the railroads of the country can appoint an officer independent of all organizations with sufficient force to investigate and authority to act it would probably anticipate a government commission and be much more valuable.

A. J. LOVE,
Late Assistant Superintendent, Alabama Great Southern.

Life of Vulcanized Timber.

The following report on the life of ties treated by the vulcanizing process and laid in the tracks of the Erie Railroad in 1882 has been made to the General Manager at the request of the American Lumber Vulcanizing Co.:

Jersey City, N. J., Nov. 7, 1906.

JAMES BURKE, Engr. M. of W., Erie Railroad.

Dear Sir:—Replying to your letter of Oct. 26th to the attached papers in reference to vulcanized pine ties which have been laid in tracks on this division:

I would state that these ties were laid on a three-degree curve on the westbound track on the Bergen County Railroad, mile 11, during the year 1882. They were removed in the year 1900, and while in the track at that point were given very severe test and when removed showed no signs of decay. They were removed owing to the fact that they were cut down somewhat by the light 63-lb. rail which we had in tracks. There were a few of these ties, however, remaining in the track after the 63-lb. rail was replaced by 90-lb. On investigating this matter I am advised that these vulcanized ties held spikes much better than any ties that have been furnished since. In addition to those placed in tracks on the Bergen County Railroad, there were some put in storage tracks at Saddle River yard and are still in tracks at that point. They are sound and good and as they have shown but very little wear to date, I am not in position to state how long they will last, but it is

our opinion that they will last several years. The majority of the vulcanized pine ties were eight feet long.

I will forward a piece of one of these to your office within the next few days. In regard to the number of those applied, I would state that there were about 700 put in the main tracks on the Bergen County Railroad and 50 in Saddle River yard.

(Signed) A. C. ELSTON, Superintendent.

These ties were treated by vulcanizing, at the plant of the United States Wood Vulcanizing Co., later the Haskin Wood Vulcanizing Co., in New York City on the Harlem river. This plant was in operation for a number of years in the '80s and turned out large amounts of vulcanized lumber which was used for the interior finish in a number of buildings put up about that time. Only a few railroad ties were treated. Part of these were put in the structure of the Manhattan Elevated and a few on the New York Central, the New York, New Haven & Hartford, the Erie and the Brooklyn Union Elevated. The original process consisted of subjecting the timber to heat under air pressure, thus cooking the wood fiber in its own liquids, which undergo a chemical change and harden in the pores, making the timber impervious to moisture and imparting a rich color somewhat like that obtained in very old seasoned stock.

A number of improvements have recently been made in the original process by the Messrs. Howard, who for many years were associated with Col. Samuel E. Haskin at the old plant. The principal change has been the substitution of a vacuum for pressure. The result obtained by this process is to remove the aqueous components of the sap, thereby eliminating the prime cause of decay. The denser fluids, albumen and pitch, are retained in the pores of the wood and, being operated upon in a vacuum by the application of the proper degree of heat, vulcanizing takes place and in the gradual cooling these fluids fill and adhere permanently to the walls of the pores, coagulating, crystallizing and solidifying in such a manner as to hermetically seal them. This action serves to strengthen the wood, and it becomes much harder and of greater

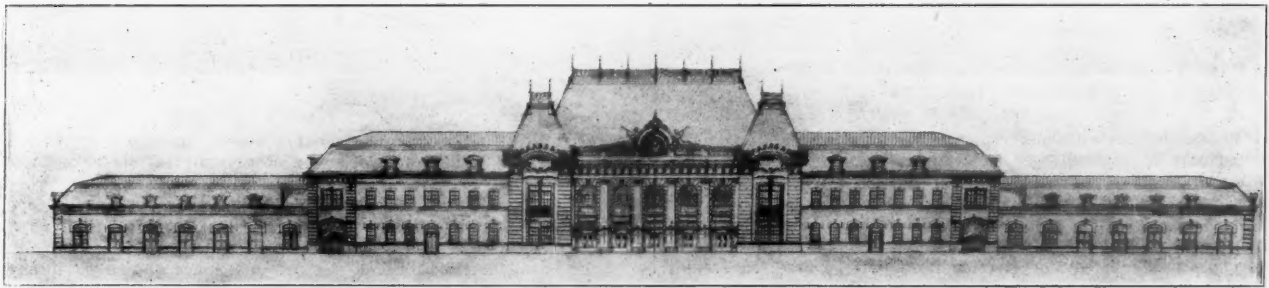
line and gives his personal attention to each student. L. J. Baird, the chief instructor, is not only an excellent block signal operator, but has had years of experience as chief clerk in a freight department, so that all intricacies of handling freight accounts are thoroughly taught.

By the system in use in the school, each student is appointed an agent and carries on the business with the others just as he would with other agents, with shippers and passengers, making his reports to the manager as he would to a railroad superintendent, auditor, treasurer or other officials. At the same time, he is instructed in the duties of an operator, train despatcher and tower signal operator. All instruction under this plan is intensely practical and has proven so successful that the problem of turning out competent agents and telegraph operators can be solved if the school can secure the students.

New Passenger Station at Salt Lake City for the Harriman Lines.

Plans have recently been completed for a large union passenger station at Salt Lake City, which will be used jointly by the Union Pacific, the Oregon Short Line and the San Pedro, Los Angeles & Salt Lake. This will complete the extensive terminal improvements which these roads have been making in Salt Lake City. A new freight yard has been built in North Salt Lake, and a large modern freight house has also been completed. Work on a steel viaduct carrying North Temple street over the approach tracks, and the lowering of the railroad grade for a distance of half a mile north of the new passenger station, is under way.

The new station will face east on South Temple street at the intersection of West Third street. It will be a through station, and the building will be parallel with the tracks. The accompanying illustration from the architect's drawing shows the appearance of the front of the building, which will be 700 ft. long, considerably larger than the proposed station in Salt Lake City for the Gould



East Front of Proposed New Station of the Harriman Lines in Salt Lake City.

solidity and tenacity. The destructive principle of the albumen is eliminated, and the pitch is converted into resin. All the soluble liquids which cause fermentation and decay, or serve as food for destructive insects are removed. The process is particularly applicable to the soft woods, such as pine, gum and cypress. It is controlled by the American Lumber Vulcanizing Co., 535 Fifth avenue, New York.

The Elmira Railroad Commercial Training School.

The Railroad Commercial Training School at Elmira, N. Y., which was established about 18 months ago to train young men as station agents and telegraph operators, has already passed beyond the stage of an experiment. Already 34 men have been graduated and placed in positions on the trunk lines, and the fact that all have given perfect satisfaction is best proof of the success of the work of the school. The use of a railroad telegraph line running through the building gives students actual experience in reading train orders and familiarizing themselves with such railroad business as daily passes over the wires. A miniature double-track railroad, equipped with block towers and block signals, over which pass one complete passenger train and two freight trains, gives practical as well as theoretical operating knowledge. The books of instruction were specially prepared by some of the most expert operating men in the country and the blanks used by the students in their daily work are exact duplicates of those used by freight and ticket agents in their work. All this equipment gives the student a chance to thoroughly learn the business of agent, operator or despatcher before he takes up actual work, and forms a sure stepping stone to success in railroad life. Any boy possessing an ordinary school education, good health and good morals can complete the course and be ready to fill a good position in one year from the date he begins study. He is in a railroad atmosphere continually from the beginning of his study. E. E. Tingley, the manager, has had 30 years' experience as operator and chief train despatcher on a trunk

Lines, the Rio Grande Western and the Western Pacific, which is to be 575 ft. long.

The building will be of brick with sandstone facing and terra-cotta cornices and other ornamentation. The central portion, 300 ft. long, will be three stories high, the two top floors being used for railroad offices. The main entrances, five in number, lead from a vestibule into a central grand hall; to the left will be the telegraph office, and beyond in the space under the south tower will be located the men's smoking room; opposite, on the right hand side will be an information bureau with the ladies' waiting room beyond in the other tower. The main concourse, reached through the grand hall, will be 30 ft. wide and 312 ft. long, running parallel to the building between it and the tracks. The train shed will be about 300 ft. long and 240 ft. wide. The extensions of the train platforms at each end beyond the train shed will be protected by umbrella sheds. Baggage elevators will be built in each train platform, and these will be connected under the tracks by a subway leading into the basement, where other elevators will raise the baggage trucks to the level of the baggage room floor. An overhead viaduct will be built out across the tracks from the second floor of the main building, with stairways leading down to each train platform, so that passengers may reach any track without crossing other tracks on the surface.

The two-story part of the building at the south end will have rooms for the news company, employees' toilet room, conductors' room, Pullman supply storeroom and baggage room, which is next to the main building. The south end of the main building between the baggage room and the main hall will be occupied by an immigrants' cafe and waiting room and barber shop. On the opposite side of the grand hall will be the news and parcel stand and ladies' rest rooms. In the two-story section north of the main building will be the yardmaster's office, emergency hospital and a cafe, dining room, kitchen, mail room, and quarters for the Pacific Express Company and the Wells Fargo Express Company.

The general design of the building is in the French renaissance

school of architecture. The interior decoration of the grand hall in the center of the main building, which will be 130 ft. long and 35 ft. wide, will be elaborately worked out with massive marble columns and marble finish. The mosaic floors will be of elaborate design, among other features being a colossal mosaic under the central skylight, representing some important epoch of the early history of the state. The building will cost approximately \$400,000.

Report of New York State Railroad Commissioners.

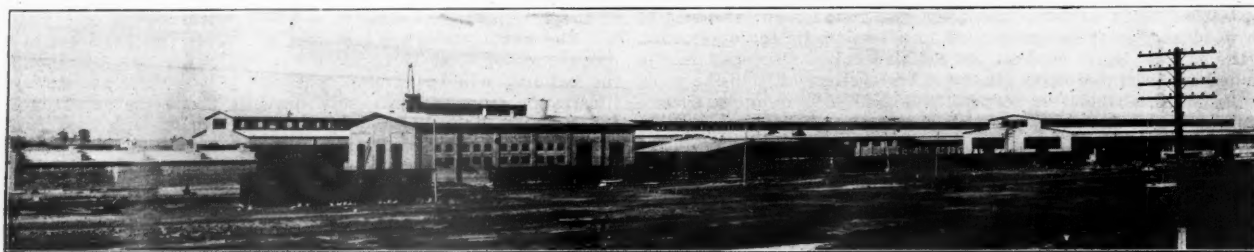
The following are extracts from the 24th annual report of the New York Railroad Commissioners. That part of the report dealing with grade crossings will be found in another column.

We believe that the time has come when by statute it should be provided that all passenger cars on all steam railroads (including Pullman cars) shall, within a limited period, be lighted by gas or electricity. We also believe that out-of-date passenger coaches, many of which are operated on steam railroads in this state, should be replaced as soon as practicable. The use of steel freight cars is increasing, and on the electric lines of the New York Central and Long Island railroads near New York City steel passenger cars are generally in use. Steel passenger cars are safer than wooden cars, and their quick installation on those railroads whose financial condition is such that it may reasonably be said they can afford them, should follow. The companies in their consideration of this subject should give the proper weight to what is due the public from

The inspector of the board reports that motive power and rolling stock, although considerably added to by purchase or construction of new locomotives and cars, are not generally in as good physical condition as one year ago, owing to the fact that the volume of business has been so tremendous that it has overtaken the carrying capacity of practically all railroads, necessitating their continued use, when their condition could have been much improved by making some repairs to them. Another reason for there being more delay to traffic than there has been generally in former years is the fact that, owing to the coal strike of last summer the roads were unable to accumulate any quantity of coal previous to the heavy fall and winter movement of freight, and since that movement commenced have experienced great difficulty in getting sufficient coal, of even inferior quality, for use, and have been obliged to use motive power and rolling stock which should have been in other service in transporting coal for their own use, and, besides, were obliged to use much coal of an inferior quality.

New Car Shops of the Wabash at Decatur.

The Wabash has recently completed new car shops at Decatur, Ill., which are especially interesting in the construction of the larger buildings. The plant includes a car shop, 88 ft. x 464 ft.; blacksmith and machine shop, 80 ft. x 294 ft.; storehouse with two story office building at one end, 40 ft. x 464 ft.; wood mill, 80 ft. x 238 ft.; tin, cabinet, upholstering, glazing and electrical shop,



General View, New Wabash Shops at Decatur, Ill.

whom the revenues are derived, and not consider alone the matter of economy to themselves. The improvements in passenger equipment which have come in the past have covered long periods of time, and the platforms, couplers and brakes which are now considered indispensable were slow in arriving. Conditions, however, have changed, and the public expects that proved advances such as are represented by gas or electric light and by steel cars shall be adopted by prosperous companies without delay.

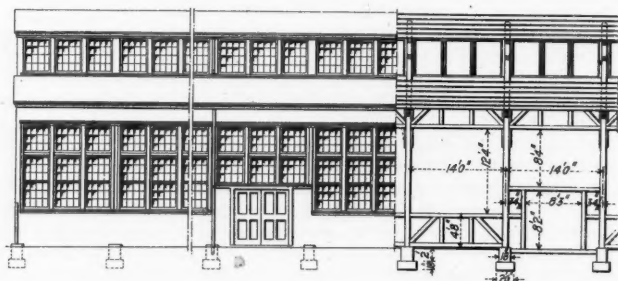
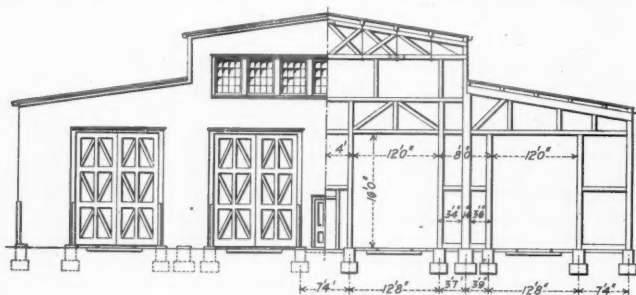
During the year a locomotive boiler inspector was appointed. He reports as follows:

The inspection of locomotive boilers under state supervision has been attended with much success during the past year. Nearly 22,000 inspections were made and reported to the Board, resulting in the discovery of a large number of defects and the condemnation of many boilers.

Prior to the passage of the boiler inspection law many roads made no inspections at all, while others employed "handy men" or other incompetent inspectors, which meant that boilers were often operated under dangerous

40 ft. x 350 ft.; power house, 60 ft. x 108 ft., besides a dry kiln, dry lumber sheds, iron, coal, coke and other material sheds and racks, and a lavatory building.

The large shop buildings have timber frames with walls formed of expanded metal plaster. There are two slabs, one on the inside and the other on the outside of the line of posts, leaving an air space between. Sections of the car shops are shown to illustrate the general character of the construction, and a detail illustrating the wall construction is also included. In wall construction the thickness of the outer slab is 1½ in. and of the inner, 1 in., the space between being 8 in. The plaster is applied to 24-gage diamond-mesh expanded steel lath secured to 1½-in. round rods stapled to the timber as shown. The shop buildings are given maximum window area for ample lighting, as may be observed in the photographic view reproduced herewith. The building at the right-hand side, illustrating this feature best, is the blacksmith and machine



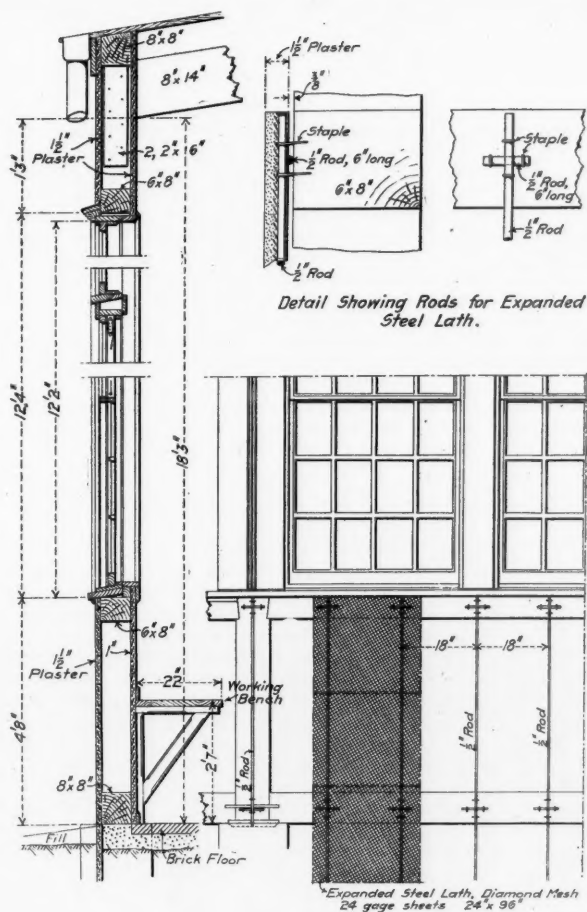
Sections of Car Shop; New Wabash Shops at Decatur.

conditions. Several roads operating in this State have no mechanical officers, consequently the boilers in the past received little or no care. These roads now realize the danger of operating old and oftentimes cast-off locomotives from other roads, and are inspecting the boilers regularly. The larger roads made inspections more or less thorough and with varying degrees of regularity, dependent on the demand for power. In busy seasons inspections and repairs were often of a most superficial character, and the safety of the boiler was a matter of doubt.

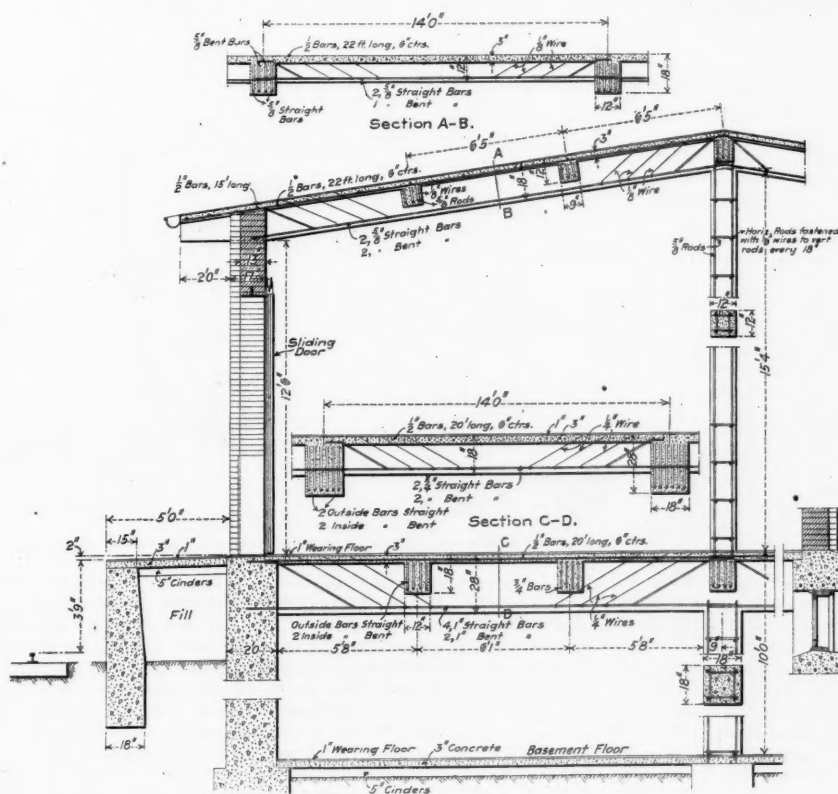
The past year has been one of great activity. There has been an enormous demand for power, and as a result locomotives have been left in service as long as possible and extensive repairs made only when absolutely necessary. These conditions are gradually being corrected, and at present all roads are inspecting their locomotive boilers regularly. Competent inspectors are employed, the officials are paying more attention to inspection and repairs and employees have been given more explicit instructions regarding inspections.

shop. The brick building about the center of the picture is the power station, to the left of which is the wood mill and the dry kiln, the latter being the low brick building at the left-hand side of the group. This building has a reinforced concrete roof, a cross-section of the building being included in the drawings. The front of the dry kiln is covered with rolling painted canvas curtains.

The opposite end of the storehouse from the office portion is reinforced concrete for 57 ft. of its length to provide fireproof storage for oils. The basement of this room contains 12 oil tanks, each 6 ft. x 12 ft. There is also in the yard a concrete pit, 20 ft. x 40 ft., with two large tanks for fuel oil for the furnaces. The yard contains a complete sewer system with septic tank, and water and compressed air systems. All machinery in the plant is a.c.



Typical Section Illustrating Wall Construction.



Details of Reinforced Concrete Oil House.

motor-driven, and the shops are lighted throughout with electricity. The Miller vacuum heating system is used for the buildings and dry kiln.

The total cost of the plant, including grading, buildings, machinery and shop yard and tracks was \$368,000. The cost per cubic foot of the different buildings was:

Car shop	2.7	cts.
Blacksmith and machine shop.....	3.0	"
Storehouse and office building.....	5.5	"
Wood mill	2.9	"
Cabinet, upholstering, etc., shop.....	4.5	"
Power house	3.4	"
Lavatory building	5.4	"
Dry kiln	1.1	"
Dry house sheds	2.3	"
Iron, coal and coke sheds	3.5	"
Material sheds and racks	5.8	"

The general contractors for the work were James Stewart & Company, St. Louis, Mo. Work was begun about the first of May and completed within six months' time. This included grading, requiring the removal of 13,300 cu. yds. of earth.

We are indebted to Mr. A. O. Cunningham, Chief Engineer of the Wabash, for plans and information.

Evolution of Railroad Car Trucks.*

In 1831 the first passenger car on any railroad in America was put on the Baltimore & Ohio on July 4th. It was built in the company's shops at Baltimore, Md., from drawings and specifications made by Ross Winans. It was twice the length of the four-wheeled cars, with center pins or king bolts, on which the trucks turned or swiveled. Experience with this car, the "Columbus," led Jonathan Knight, Chief Engineer of the Baltimore & Ohio, to report strongly in favor of the use of springs under freight cars on that road. His recommendation was approved, and a test of springs followed to determine which kind could be safely used.

As 1831 drew to a close, the vexatious question of front trucks under engines was solved by Ross Winans, who took out the front pair of wheels of an engine, replacing them with a four-wheel truck, swiveling successfully in rounding curves on the Baltimore & Ohio. John B. Jervis reached the same conclusion as to the "Robert Franklin" on the Mohawk & Hudson. It is difficult to say just which one of these, if either, thought out the plan. In either event it was not new in principle in 1831 any more than in 1830 on the Quincy & Granite road, or in 1813 with the Chaplins in England. It had its origin in the first cars built to run on the road, in which the first wheel was turned by a locomotive, the "Merthyr Tydvil," in South Wales, and these cars still exist to prove the fact that the bogie truck is primarily and historically an English, or rather

a Welsh idea. There is no question, however, as to the experiment built at the West Point foundry from designs and plans of Jervis being the first locomotive in the world constructed with a bogie or swiveling truck under the front end.

The trucks used on the Baltimore & Ohio in 1862 had side frames made of a piece of oak timber, extending beyond, and resting upon the oil boxes, to which they were fastened with light bolts, no springs being used. A truck used on the Illinois Central Railway in 1873 was of the arch bar or diamond pattern without springs.

Mr. John Kirby, the veteran car builder of Lake Shore & Michigan Southern, says: "My earliest recollection of freight car trucks was 1848. They were built with wood wheel-pieces, cast-iron jaws, and half elliptic steel springs through the jaws. The bands rested in a recess on the oil box. The ends bore on cast-iron shoes under the side of the wheel-piece. There being no factory in the United States where springs of that kind were made, they were imported. Aaron French was a journeyman blacksmith at that time, or was going to school. When rubber began to be put in for springs, steel springs in a measure were discontinued. The rubber, about 5½ in. in diameter and 5 in. high, was placed on top of the wheel-piece; a spindle passed through the spring and wheel-piece and one end rested on top of the oil box. That was in about 1850. At a later date rubber was placed on top of the oil box. My recollection is not clear as to the date when the first diamond

*Extract from a paper by W. E. Symons, read before the Southern and Southwestern Railway Club, Nov. 15, 1906.

freight car truck was made, but it must have been as early as 1860."

Some 12 or 15 years ago the Fox pressed steel truck came into quite general use, and many thousands of them are still doing good service under cars in all parts of the country. Following the Fox came the Kindl, Sterlingworth, Buckeye, Cloud, Schoen and several other types, some pedestal, and others of the open jaw pattern, but all made of steel plates and assembled with rivets. In some instances these pressed steel shapes have been displaced by the old arch bar type, with its multiplicity of parts, and unavoidable dead weight, while others have taken up the cast-steel designs, of which there are several now offered the railroad trade.

A large steel company in St. Louis has made wonderful strides in the past two years in the introduction of cast-steel in the railroad field. It has made a car truck, which differs somewhat from any others, in that a section of the top member is removable to permit of placing the truck bolster in its proper location, after which this member is returned to place, and becomes a compression member. The usual forms of column and oil box bolts used in the arch bar type of truck are retained. Another large company in St. Louis makes a pedestal type truck. Another device is a passenger car truck of the six-wheel type, the frame of which is made entirely of cast-steel in place of a combination of wood, iron plates, bolts, brackets, angle bars, rods, stiffening plates, etc. It is a new departure in this direction, and is indicative of the extent to which it is possible to use cast-steel in car and locomotive construction. Still another company is making a cast-steel truck, which is a radical departure from the old arch bar, and all other types of built-up trucks, in that the side frames and oil boxes are all cast in one piece, thus eliminating not only the parts entering in and constituting the frame proper, but also the oil box and bolts or keys ordinarily used in other types of steel trucks to retain the oil boxes in place. These trucks to date have been placed under 5,000 cars, and 5,700 more are on order to fill, which would require 10,165 tons of steel.

One company is offering the railroads a cast-steel car and tender truck, wherein the side section of an arch bar type of truck is displaced or substituted with cast-steel. Every piece entering into the construction of, or used in assembling the arch bar truck frame is eliminated, except the outside oil box bolt in place of which is used a semi-circular key. There is also provided what is termed the universal oil box receptacle, which permits the use of any style, type or make of oil box coming within the M. C. B. requirements. A low or straight top arch bar style is provided for cars of a low floor level or center of gravity, such as furniture, ballast, buggy, tank or other cars for similar service; also engine tenders. This truck is also provided with a poling pocket device when desired. The cross or connecting members are provided with a view of absorbing, as far as possible, all torsional strains due to undulating track or imperfect roadway, without the possibility of either the side frames or cross members sustaining any injury, and at the same time retaining sufficient rigidity between the two respective side members, to insure their being kept in proper alinement. The present designs offered by the company referred to are a modification of their earlier type, some of which were placed in service five or six years ago, and in the construction of which the cross members were also of cast-steel, quite heavy, and which proved to be entirely too stiff or rigid to allow the truck to adjust itself to the imperfections of roadway.

The evolution of the freight car truck is clearly detailed in a comparative statement as follows:

First.		Third.	
Pieces.	Weight.	Pieces.	Weight.
2 top arch bars	294	2 frames (cast steel)	700
4 columns	100	4 brake-beam hanger studs	32
2 bottom arch bars	314	4 journal boxes with lids	340
2 tie bars	124	8 journal box bolts	76
4 journal boxes with lids	340	16 nuts	17
8 journal box bolts	77	8 cotter for journal box bolts	1
16 nuts	17	2 tie bars	124
8 cotters	1	2 angles for spring plank	213
1 spring plank	272	16 bolts for spring plank	12
8 spring plank bolts	7	32 nuts for spring plank	17
16 nuts	8		
4 column bolts	76	94 Total pieces	1,532
8 nuts	32	Spring plank and all nuts and bolts must be removed to permit removal of bolster from truck frame.	
4 cotters	1		
4 brake-beam hanger bolts	7		
4 nuts	3		
95 Total pieces	1,673		

Second.		Fourth.	
Pieces.	Weight.	Pieces.	Weight.
2 frames (cast steel)	690	2 frames with boxes (cast st'l)	950
2 compression bars	90	1 spring plank	90
2 tie bars	124		
4 journal boxes with lids	340	3 Total pieces	1,040
8 journal box bolts	76		
16 nuts	17		
8 cotters	1		
1 spring plank	272		
8 spring plank bolts	7		
16 nuts	8		
4 column bolts	76		
8 nuts	32		
4 cotters	1		
4 brake-beam hanger bolts	7		
4 nuts	3		
91 Total pieces	1,744	23 Total pieces	1,229

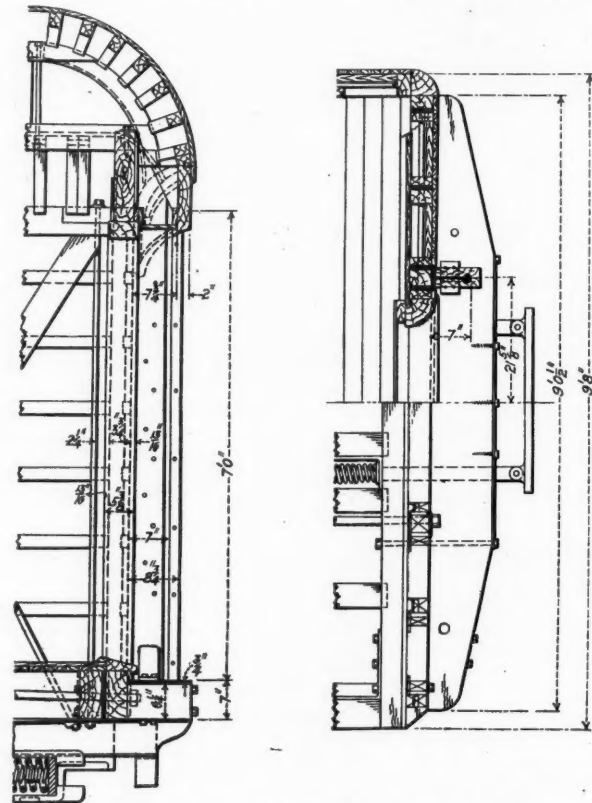
Summary.

	Weight.	Excess w't. per truck.	Excess w't. per car.
Second	1,774	734	1,468
First	1,673	633	1,266
Third	1,532	492	984
Fifth	1,229	189	378
Fourth	1,040	0	0

The purpose of most, if not all, the inventors of steel trucks has been to eliminate the multiplicity of parts entering into the construction of the arch bar type of truck, and, while some may have been actuated or stimulated by other motives, yet the general result has been beneficial in that railroad officers have recently, almost unconsciously in some instances, substituted steel castings for wrought-iron in the construction of freight and passenger car trucks, when only a short time ago they would have ridiculed the proposition to use it, and the prophecy would seem to be a conservative one that at present progress it is only a question of a short time when the further endorsement of cast-steel by the most eminent engineers and practical railroad officers of the country will result in turning a great army of blacksmiths, carpenters and other similar artisans from their present occupation to the advanced and scientific manufacture and application of cast-steel in its various forms as used in car and locomotive construction.

Strengthening Ends of Postal Cars on the Seaboard Air Line.

The United States government is very particular in the matter of the specifications regarding the strength of the framing of the postal cars that are used upon the railroads of the country, and very insistent that these specifications shall be followed in the construction of the cars. In addition to the item of ease of riding and general strength, one of the most important points is that of strengthening the ends of the cars in order to insure as great an immunity as possible against telescoping in case of collision. For this it



Method of Stiffening Ends of Postal Cars on Seaboard Air Line.

is required that all new cars shall be especially stiffened at the ends, both at the corners and on either side of the door. These requirements have been extended to all cars whether new or old.

In order to avoid the scrapping or conversion of old postal cars to baggage or express service, the Seaboard Air Line is using a special form of door stiffening that meets all the requirements of the Post Office Department. The principal feature consists of laying a bulb iron against the outer face of the door posts and bolting it in position through the flanges. At the bottom the bulb and web are cut away and the flange extended down in front of the body end sill and between it and the buffer beam. At the top, the bulb and web are beveled back from the bottom of the hood to the top of the end plate. Additional stiffness is also obtained by the use of a $\frac{3}{4}$ -in.

plate laid upon the top of the buffer beam, which serves as a base upon which the bulbs rest. As these project beyond the face of the car they are encased in wood so as to make a harmonious finish for the end, which thus appears to have a wooden post set outside each door post.

As a matter of fact, while the drawing shows the use of regular bulbs for this work, in actual practice old rafis are used. These meet all the requirements as to strength, and are much cheaper, besides being quite as readily applied.

Proposed Railroad Legislation in Pennsylvania.

The following summary of railroad measures which have been brought before the legislature of Pennsylvania, a state long noted for its favorable treatment of corporations, is suggestive of the legislative regulation which railroads are meetings in all parts of the country. In Pennsylvania a new Governor, Edwin S. Stuart, began a four-year term on January 15, 1907. His inaugural address favored laws providing for a two cents a mile passenger rate on railroads, giving electric railways the right of eminent domain and the right to carry freight, the creation of a state railroad commission, and prohibiting common carriers from engaging in any other business than that for which they were chartered. The legislature is reported to be heartily in accord with this program. Already a joint resolution has been introduced providing for the appointment of a committee of seven to "investigate alleged violations of the constitution and laws of the state by railroad companies, their directors, officers, agents and employees." Under this resolution coal companies also are to be investigated. The committee, if appointed, is to hold sessions in Philadelphia, Pittsburg, Harrisburg, Scranton and other cities. The general object of this resolution is understood to be to carry further the investigation among officers of the Pennsylvania begun by the Interstate Commerce Commission last year. The following bills have already been introduced:

Providing for a new survey by the state of the 12,000 miles of railroad to secure a revision of distances between certain points and a consequent saving in fares. This bill appears to be aimed at reducing the mileage in cases where railroads have taken out curves and otherwise shortened their lines. It carries an appropriation of \$100,000, a sum which it will take some time to save in passenger fares reduced from this cause.

Providing for a state board of railroad commissioners.

Providing for a maximum passenger charge of two cents a mile, tickets to be good until used.

Providing for proper sanitation of railroad cars.

Providing for regulation of freight rates and prohibiting discrimination in rates for long and short hauls.

Permitting electric railways to carry freight subject to the regulations of municipal councils.

Requiring railroads to publish their train schedules in at least three newspapers in each county entered by their lines.

Granting enlarged powers to courts of common pleas to decree forfeiture of rights and privileges of a railroad whenever such railroad shall have violated or failed to comply with all the terms imposed in the franchise granted it by any municipality or failure to perform any of the corporation functions for which it was incorporated. The bill provides that the court can either fix a time limit for complying with the provisions of the company's charter and franchises or decree their forfeiture.

Providing for taxation of corporations 10 mills on each dollar of actual value of the whole capital stock of all kinds; one-half of this revenue to go to the various counties for school purposes and relief of local taxes.

Providing that all persons in charge of signals, switches, locomotives, trains or telegraph offices at the time of an accident shall be deemed "vice principals," and that where any defect in arrangement or machinery is shown it shall be taken as *prima facie* evidence of neglect.

Requiring enclosed vestibules on all steam and electric passenger cars.

Milling-in-Transit With Variations.

The decision in the case of the Alabama & Vicksburg Railway Company against the Railroad Commission of Mississippi wherein the Supreme Court of the United States, affirming a ruling of the Supreme Court of Mississippi, has sustained the right of a state commission to enforce equality of intrastate rates has already been reported. The facts, as stated by Mr. Justice Brewer in announcing the opinion of the court, were that the company made what it called a "rebilling rate" of 3½ cents per 100 lbs. on grain products shipped from Vicksburg to Meridian, that rate, however, being applicable only on shipments coming to Vicksburg over the Vicksburg, Shreveport & Pacific. Instead of being used only as a rebilling rate, the Vicksburg merchant who received a carload of grain or grain prod-

ucts over the V. S. & P. road was permitted to either forward it to Meridian, or, at any time within 90 days, in lieu thereof, send a similar carload at the same rate, no matter whence received. The Mississippi Commission made an order directing that all grain products shipped from Vicksburg to Meridian should be at the same rate (3½ cents), so that merchants receiving over the V. S. & P. would have no advantage. The court said:

"It is unnecessary to inquire whether the order could be sustained if it appeared that the plaintiff received only 3½ cents as its share of a total rate on through shipments to Meridian from the northwest by the Shreveport road; for here, under the guise of a rebilling rate, the Vicksburg merchant who dealt with this western road was given a rate of 3½ cents on any grain that he might see fit to ship to Meridian. While it may be true that a local railroad's share of an interstate rate may not be a legitimate basis upon which a state railroad commission can establish and enforce a purely local rate, yet whenever, under the guise or pretence of a rebilling rate, some merchants are given a low local rate the commission is justified in making that rate the rate for all. It is not bound to inquire whether it furnishes adequate return to the railroad company, for the state may insist upon equality, to be enforced under the same conditions against all who perform a public or quasi public service. When voluntarily the A. & V. established a local rate of 3½ cents from Vicksburg to Meridian for those who had within 90 days made [received] a shipment over the Shreveport road, it estopped itself from complaining of an order making that rate applicable to all shipments, no matter whence they arose, and in favor of all merchants, whether those transporting over the Shreveport road or not. We are not unaware of our decision in Texas & Pacific vs. Interstate Commerce Commission, 162 U. S. 197, in which, on review of the interstate commerce act, we held that a mere inequality of rate was not always proof of undue discrimination; but we were passing upon an act of Congress and seeking to ascertain its intent and scope. There was no intimation that it was not within the power of Congress to prescribe an absolute equality of rate. In the present case we are not construing an act of the state of Mississippi or passing upon the powers which by it are given to the State Railroad Commission. Those matters are settled by the decision of the Supreme Court of the state, and the question we have to consider is the power of the state to enforce an equality of local rates as between all parties shipping for the same distance over the same road. That a state has such power cannot be doubted, and it cannot be thwarted by any action of a railroad company which does not involve an actual interstate shipment, although done with a view of promoting the business interests of the company. Even if a state may not compel a railroad company to do business at a loss, and conceding that a railroad company may insist, as against the power of the State, upon the right to establish such rates as will afford reasonable compensation for the services rendered, yet when it voluntarily establishes local rates for some shippers it cannot resist the power of the state to enforce the same rates for all. The state may insist upon equality as between all its citizens, and that equality cannot be defeated in respect to any local shipments by arrangements made with or to favor outside companies."

Shop Belting Practice on the Santa Fe.

In the articles on the shop betterment work on the Santa Fe which appeared in our issues of Nov. 30 and Dec. 7, 1906, brief reference was made to the great improvement that had been made in the shop belting practice of that road. The comparative costs of maintenance before the work was begun and at the time the article was prepared were given, and it was stated that a book of rules and instructions for belt repairmen had been distributed, and a rigid set of specifications for belting had been drawn up by Mr. H. Emerson, in charge of the betterment work. Believing these specifications and the repairmen's rules and instructions to be of general interest to all shop men, we reproduce them herewith.

SPECIFICATIONS FOR BELTING.

Belting must be of the best oak tan, first quality leather, strictly short-lap stock, cut within 18 in. of the center of the hide and no piece running over 4 ft. 6 in. long; tanned under the long time process, absolutely free from acids or other ingredients for quickening the tannage or increasing the weight.

Belting must be of uniform thickness and width and will be inspected at destination. Any belting showing uneven thickness or width, or flabby soft spots, will be rejected and must be replaced at once without cost to the railroad company.

All belts must have a tensile strength of not less than 4,200 lbs. per square inch in either the leather or the splice, and show elongation of not over 12.5 per cent. in 2 in., 1 in. either side of the break, or less than 8 per cent. elongation at breaking strain.

Any double, triple or quadruple belt which starts to crack or give way between the layers comprising the belt before reaching

a tensile strength of 2,500 lbs. per square inch will be rejected. All belting will be furnished in three grades as below:

Heavy, weighing 17 to 19 oz. per sq. ft.
Medium, weighing 15½ to 16 oz. per sq. ft.
Light, weighing not less than 14 oz. per sq. ft.

The above weights are guaranteed to be more than 10 to 13 per cent. above the actual weights of the leather after treatment by gasoline or other process to remove any stuffing or filling.

All belting must bear the manufacturers' brand and name on every 10 ft. of belting.

All belting when received at destination will be laid out flat to its full length and must lie in a straight line from end to end, both edges of the belting lying flat upon the floor.

Guaranty.

If the belting as received does not in every particular comply with the above specifications, it will be rejected and replaced by the seller without expense to the railroad company. It is further guaranteed that the belting will run practically straight and not stretch to trouble where shafting and pulleys are right and care has been used in placing it upon the same.

RULES AND INSTRUCTIONS FOR BELT REPAIRMEN.

Width of Belting.—A pulley should be 25 per cent. wider than the belt running on it. This rule should be followed as closely as possible and especially with cone belts.

Tension and Thickness of Belts.—Belts should have a tension when at rest of about 100 lbs. per square inch of width of good double belting. If not practicable to measure tension on the belt, make the fit length 1 in. per 10 ft. less than the tape measured length over pulleys. A steel tape should be used. Great care should be used to prevent the running of too tight belts and consequent burning of bearings.

Double belts should not be run on pulleys less than 6 in. in diameter, and triple belts on pulleys less than 20 in. in diameter. Belts should sag onto pulleys and not away from them. Very short drives (belts under 20 ft. long), should be avoided. Whenever possible, run up-and-down belts on a slant so that belt will sag onto pulley.

For each horse-power to be transmitted, allow 80 sq. ft. of double belt to pass over the pulleys per minute; allow 160 sq. ft. of single belt, or 1,000 lineal feet of double 1-in. belt., or 2,000 lineal feet of single belt.

Kind of Lace to Use.—For general service, the Jackson lace should be used and new belts should have a 6-in. take-up piece

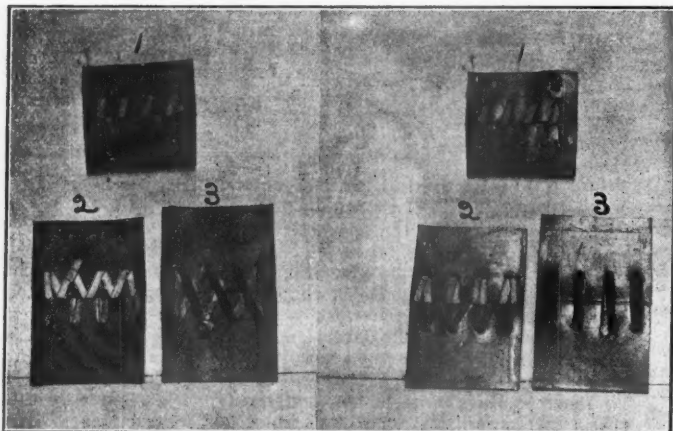


Fig. 1—Rawhide Laces.

Numbers correspond to paragraphs regarding these laces.

put in them to permit tightening of belt by putting in a shorter piece and thus avoiding the need of taking entire belt down. Belts with Jackson lace should have a take-up piece in them at all times. Pieces should be kept in stock in sufficient numbers to avoid the necessity of making one in an emergency. The lengths should be 6 in., 5 in., 4 in., 3 in., 2 in. and 1 in.

The Kerr lace may be used to hold very thick belts and small feed belts which the Jackson lace will not accommodate.

The rawhide lace may be found by trial to give better service on some wood-working machines than either the Jackson or Kerr laces, but it is generally best to make the belt endless if neither Kerr nor Jackson lace give satisfaction.

Endless Belts.—All machines furnished with any means of taking up the stretch should have endless belts. Large overhead drive belts (over 6 in. wide), should be made endless as soon as stretch

is taken out. It is not advisable to make new belts endless at installation on account of the stretching. Wood-working machinery having belts which do not require too frequent tightening will run better with endless than laced belts. Side and bottom head belts on planers, matchers, etc., should be run endless.

Cleaning and Oiling.—Belts which have become too greasy and dirty should be cleaned in gasoline, then scraped and wiped with waste. In dry, dusty places it is well to brush them occasionally with a broom or stiff brush.

No rosin or belt "dope" should be used except fish oil and tallow mixed in equal parts. Apply hot with a brush when belt is running or dip belt in "dope" tank, then dry and wipe off any grease which may have hardened on belt. If applied while running, care should be taken not to get too much on belt, or it will cause it to slip. When properly applied, the mixture of fish oil and tallow will make belt pull better than any of the commercial dressings.

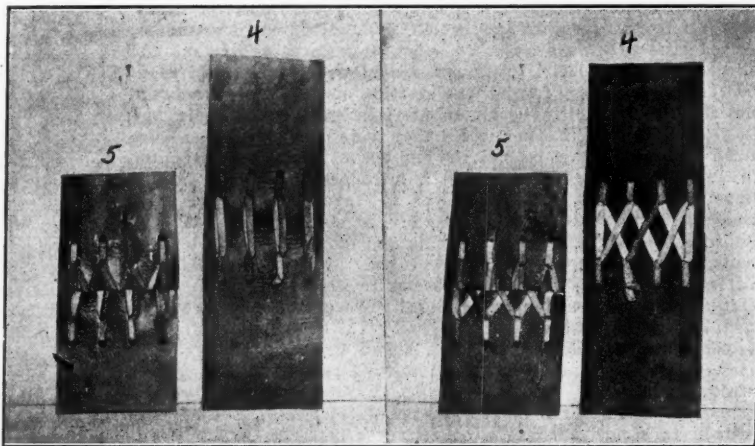


Fig. 2—Rawhide Laces.

No mineral oil should be allowed to come in contact with belt. New belts should be treated with fish oil and tallow before using, and any belt which becomes dry, hard and glossy in service should have an application of the dressing. This is especially true of belts in blacksmith shops. The oil will check to some extent the evil effects of the smoke, sulphur gases and dirt, and the life of the belt will thereby be lengthened.

Inspection of Belts.—Close attention should be given to condition of belting, to prevent damage to it and delay to machines. Such delays can be reduced to a minimum by making repairs as soon as weakness develops. Main drive and section belts should be watched very closely since a failure of one of them may shut down a number of machines for a considerable length of time.

Operation of Belts.—The most essential thing to successful operation of belts is that pulleys and shafting be properly lined and in good repair. It is bad practice to throw a pulley out of line to favor a bad belt. Belts should be run with the hair side to face of pulley. Run belts so that the outside point of splice trails. This will avoid opening of splice by action of the air. Belt should never be run twisted or cross-stepped on cones.

Keep pulleys clean and avoid having mineral oil or grease coming in contact with belts. If hard grease or dirt is allowed to pile up in corners of cones so as to form a fillet, the belt will be very likely to climb, turn over or twist. In turning faces of cones, a clearance should be cut in the corners. A drive pulley carrying a shafting belt should never have a crown. In throwing belts onto pulleys, first put belt on the driven pulley (loose if there is one), and then run it onto the driving pulley. Avoid accidents by stopping motor or engine and then run belt on while starting slowly.

Care should be taken never to run a belt off a moving pulley onto some part of shafting or machinery on which it might catch. If it is necessary to cut a belt down, care should be taken not to waste the leather.

A belt should never be dampened in order to open a splice. An awl should be used, gradually scratching or ripping splice apart.

It is good practice to remove tension from belts by lifting idlers, running off of pulleys, or removing from machine when convenient at quitting time. All cone and other machine belts should be run off of pulleys at quitting time on Sundays.

Jackson or Machine Lace.—Follow instructions accompanying machine carefully. Be sure to use a needle of the size specified for belt which is to be laced. Too small a needle will stall while too large a one will be spoiled by forcing through the rolls. Clamp belt lightly at first and tighter if needle sticks. Under no circum-

stances should the two set blocks in front of roll be set tight against rolls. They are merely a steady rest and will bend roll if set tight. After lacing, the wire should be flattened into the belt by squeezing and hammering.

Fasten ends of wire by cutting coil about $\frac{1}{8}$ in. from belt bending into semi-circle and driving into leather. Use as large a rawhide pin as will go through the lacing. Cut off ends a little inside of edge of belt in order that pin will not catch the hands when belt is thrown or shifted.

A right and left-hand lace should always be mated together. Material should be used with an eye to economy. Rawhide pins can often be used again when once removed. Blunt needles can be repointed with a file and coils of wire should be cut close to belt.

Rawhide Laces.—1. Single Hole, Single Hinge Lace.—Used in light grade single belts running over small pulleys (6 in. diameter or under), at high speed transmitting light power. In making this lace it is necessary to have an even number of holes in one end

diameter or over), transmitting heavy power. This lace can also be used to advantage in a belt when the single hole lace has pulled out the holes.

In making this lace the same number of holes is punched in each end of belt. The holes are evenly spaced on center lines square with edge of belt, the first one not less than $\frac{3}{4}$ in. from end and the second one not less than $\frac{3}{4}$ in. from first one. Use No. 6 oval punch. Place long diameter of oval lengthwise of belt. Begin at center and double-lace as in No. 3 (single hole, double straight lace), except pass every other time through the second line of holes. Pull the laces as tight as possible. Run straight side next to pulley.

5. Double Hole, Double Hinge Lace.—Used in medium and heavy grade single belts, and in light grade double belts, running over small pulleys (10 in. diameter or under), at high speed transmitting heavy power. This lace can also be used to advantage in a belt where the single-hole lace has pulled out the hole.

In making this lace the same number of holes is punched in each end of the belt. The holes should be evenly spaced on center lines square with edge of belt, the first one not less than $\frac{3}{4}$ in. from end and the second not less than $\frac{3}{4}$ in. from the first. Use a No. 6 oval punch and place long diameter of oval lengthwise of belt. Bevel off the edges of belt on both sides. Begin at center and double lace same as in No. 2 (double hole, double hinge lace), except pass every other time through second line of holes. Pull the laces as tight as possible and run either side of belt next to pulley.

Kerr Lace or Hand Wire Lace.—To be used in roundhouses and other small shops where there are not enough belts to necessitate a lacing machine; also to be used on small feed or pump belts or on belts over $\frac{1}{2}$ in. thick which cannot be handled in machine. Follow directions on box. Groove belt for straight side of lace which should be run next to pulley. Care should be taken to cross none of the wires.

Cement Splices.—The first thing to be noted in making a cement splice is to see that the pieces put together are of about the same grade, width and thickness. See that the splices lie in same direction in the same belt. Splices should be made of the length given in table below:

Width of belt.	Length of splice.	Width of belt.	Length of splice.
1 in.	5 in.	6 in.	8 in.
2 in.	5 in.	7 in.	8 in.
3 in.	6 in.	8 in.	9 in.
4 in.	6 in.	9 in. to 18 in.	Same as width
5 in.	7 in.	Over 18 in.	18 in.

Splices should be worked down to a perfectly smooth even surface, square with edge of belt both at the point and back. Care should be taken that splice is no thicker than rest of belt. If splice is thick, belt will not run even. Square both ends of splice from the same edge of belt. Work on a perfectly smooth flat surface. After dressing ends for splice, place them together on a board 1 in.

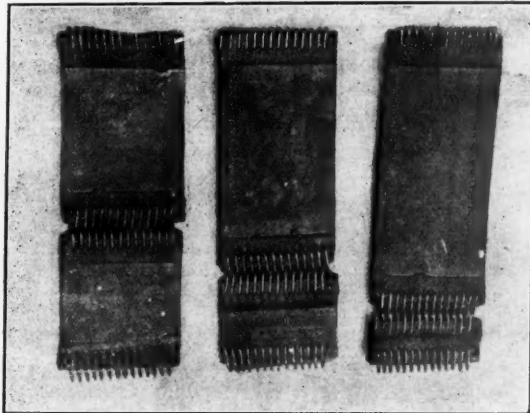


Fig. 3—Jackson Laces—Take-Up Pieces.

of the belt and an odd number in the other end so that the holes in one end will come opposite the spaces in the other end.

Bevel off the edges of the belt on both sides. The holes should be evenly spaced on a center line square with the edge of the belt and not less than $\frac{3}{4}$ in. from end. Use a No. 6 oval punch. Place long diameter of oval lengthwise of belt. Begin at the center hole and draw through until half is on each side of belt. Then pass one end down through between the belts and up through next hole towards edge. Repeat until edge is reached with both ends of lace. Cut a slit with knife back of last hole and fasten lace by passing through this slit and into another slit back of first slit and cut back into belt. Pull the laces as tight as possible. Either side of lace will run next to pulley.

2. Single Hole, Double Hinge Lace.—Used in medium and heavy grade single belts, running over small pulleys (6 in. diameter or under), at high speed transmitting heavy power.

In making this lace, the same number of holes is punched in each end of belt and they should be evenly spaced on a center line square with edge of belt and not less than $\frac{3}{4}$ in. from end. Use No. 6 oval punch. Place long diameter of oval lengthwise with belt. Bevel off the edges of belt on both sides. Begin at center and double lace. Pull lace through until half is on each side of belt. Pass lace through between belt ends and back through opposite hole, repeating this operation until edge is reached, then back to starting point in same manner. Fasten by doubling one end back through last hole and catch other end in loop. Cut off lace $\frac{1}{4}$ in. from belt and notch. Pull laces as tight as possible. Run either side of lace next to pulley.

3. Single Hole, Double Straight Lace.—Used in light and medium grade double belts in running over large pulleys (16 in. diameter or over), transmitting light power.

In making this lace the same number of holes are punched in each end of belt and they should be evenly spaced on center line square with edge of belt and not less than $\frac{3}{4}$ in. from end. Use No. 6 oval punch. Place long diameter of oval lengthwise of belt. Begin at center and double-lace, pulling lace through until half is on each side, then on pulley side go straight to opposite hole, through this across to hole next towards edge of the other side. Repeat until edge is reached, then lace back to starting hole in same manner and leave ends as in No. 2 (double hole, double hinge lace). Pull laces as tight as possible and run straight laced side next to pulley.

4. Double Hole, Double Straight Lace.—Used in light, medium and heavy grade double belts running over large pulleys (10 in.

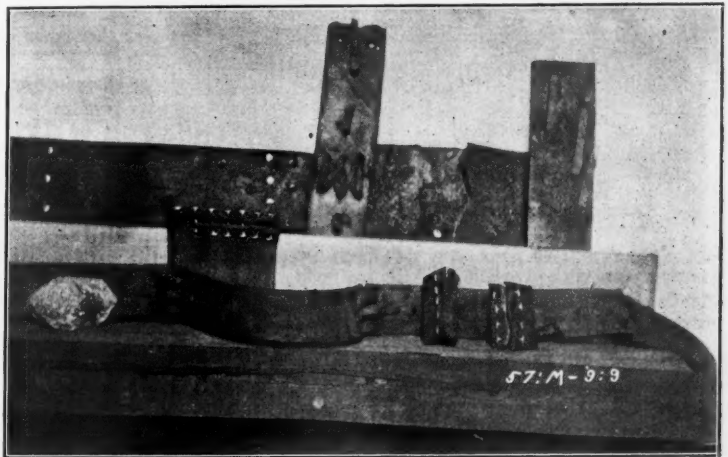
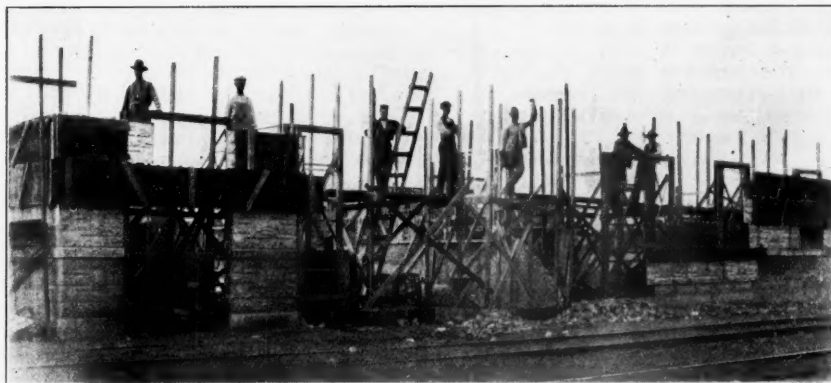


Fig. 4—Samples of Poor Joints and Belt Rotted by Rosin.

longer and $\frac{1}{2}$ in. wider than splice. Place edge from which splices are squared in a perfectly straight line. Tack belt to board just back of splice. Open splice and spread on hot glue, place another board on top of splice and clamp tightly with hand clamps or in a press. (An old letter press makes an excellent belt press.) If press is used, ten minutes is long enough to keep pressure on belt, but if hand clamps are used they must be left on for three or four hours. In either case, the belt should not be put under tension for at least five hours after gluing. Paper placed between the boards and the belt will prevent belt from becoming glued to board.

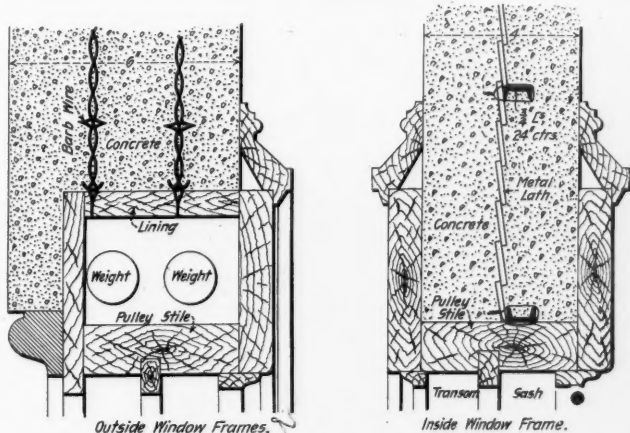
Greasy belts should be cleaned in gasoline before attempting to cement them. Any grease in belts or glue is liable to cause splice to fail. No rivets, wire, pegs, or any other fastenings aside from cement should be used in splicing belts. Ordinary furniture or pattern-maker's glue is satisfactory for belting.



Method of Concrete Construction; Sweetwater Station of the Texas & Pacific.

concrete mixture is poured into galvanized forms, made in any length. This method has been devised by E. G. Kemper, of Burlington, Iowa. One of these forms is shown in one of the photographs where it is held up on end by a man. The outside walls of the station are 6 ft. thick. All partition walls are 4 ft. thick, reinforced with double twisted barbed wire, as shown in the sectional drawings.

In building by this method two layers of plates are necessary;

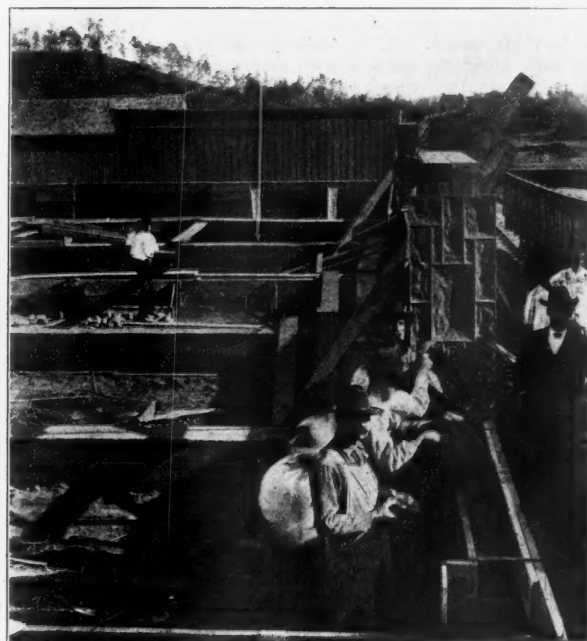


Details of Concrete Reinforcement; Sweetwater Station.

the concrete is poured into the plates, which in due time are removed and placed on the blocks thus formed. The concrete is then poured in again, a new layer of blocks is formed, the plates are removed, and so on until the wall is finished. The inside surface of the plates is grooved or shaped according to the desired pattern. Before the concrete is poured, the plates are plastered with a 1/4-in. facing of cement and sand, which gives a finished appearance to the

transported to the scene of building and put in place.

This station was poured, not built. No joists are used, all supports and partitions being of reinforced concrete. It is therefore fireproof. The hollow walls tend to make it cool in summer and warm in winter. As there are no mortar joints, water cannot get into the building, and the walls are not damp. This is the only



Pouring Concrete Into Forms; Sweetwater Station.



Part of Sweetwater Station Showing Concrete Facing; One of the Concrete Forms in Front of Door on Left.

wall. The walls may be of any thickness desired, but are made hollow with a tin box as a core.

The new feature of this method is that galvanized iron instead of wooden molds are used. In this way a more finished appearance is given to the walls, saving the expense of plastering over and grooving the concrete after it comes out of the molds. Moreover, with wooden molds only a plain stone finish can be given.

The value of concrete as a building material has long been recognized, and various machines have been invented for the manufacture of concrete blocks. The machine-made blocks, it is claimed, are dry and absorb moisture readily, causing disintegration in course of time, besides rendering the walls of a house damp. The blocks, of course, after being manufactured must be

station of this type built by the Texas & Pacific thus far. It has given general satisfaction both in appearance and strength, and it is believed to be in some cases cheaper than brick or frame construction.

For the information and drawings we are indebted to F. W. Kane, Architect of the Texas & Pacific.

Modifications of the Diversion Agreement.

A meeting of the railroads in the Diversion Agreement was held in Chicago on Friday, January 18, 1907. The general feeling was expressed by the representatives present that the Diversion Agreement had brought about good results and proved that the experiment thus far had been a success. It was decided to modify the agreement as affecting several of its requirements. One of the amendments provides that cars may be delivered empty to a connection for loading to the home road or home route, to be returned within ten days. Formerly the requirement was that the car must be returned within four days. The other amendments provided that the

diversion penalty will not apply to the delivery of loaded cars in switching service and that such deliveries shall be indicated on the junction report by the word "switch." It was also decided to add the destination of cars to the junction reports. The discussion developed the fact that an earnest effort is being made by the railroads in the agreement to properly handle foreign cars.

Timmis Smoke and Spark Consuming System.

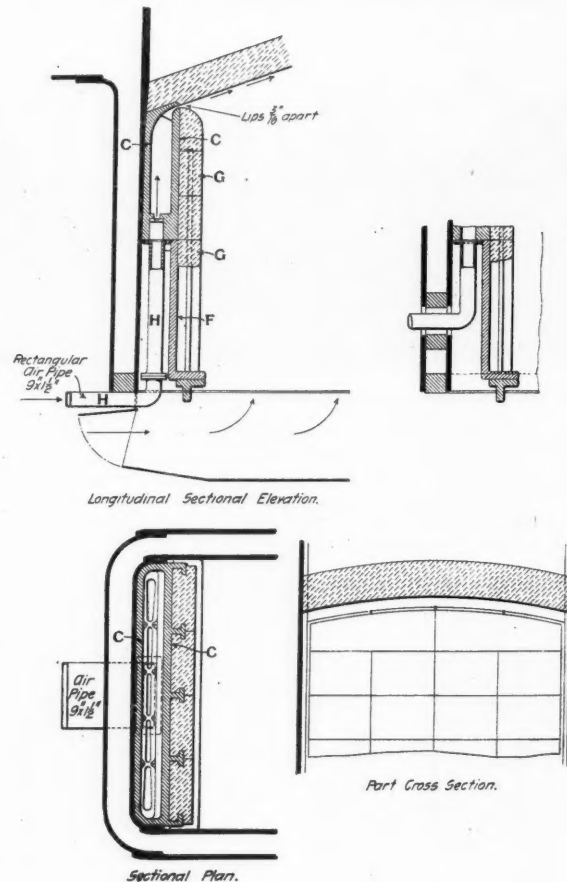
The beneficial results of smoke prevention by admitting air to the firebox above the fire are known. The users of the hollow staybolts cite this as among the chief advantages. Sometimes we find a number of tubes set in the back head through which comparatively large volumes of air can be admitted above the fire. All of these devices are efficient in a way, but are not efficient enough. Successful experiments have recently been made in England with a new device to accomplish this same purpose, and a saving in coal is said to have been effected. It has been designed by Major I. A. Timmis, of 2 Great George street, London, and consists of an apparatus for forcing air in the front end of the firebox immediately below the brick arch.

That portion of the apparatus in the firebox is shown in the illustration to be a hollow casting, C, coming close to and against the bottom of the brick arch, and having an elongated opening, turned to the rear, with lips $\frac{3}{16}$ in. apart. This casting is carried by a foot, F, that rests on a cross beam, the whole being protected by a wall of firebrick, G. The casting and the extra brickwork take up about 11 in. of room, so that the grate is shortened by that much. It is claimed, however, that this has no detrimental effect on the action of the engine because the improvement in combustion more than compensates for the decrease in grate area.

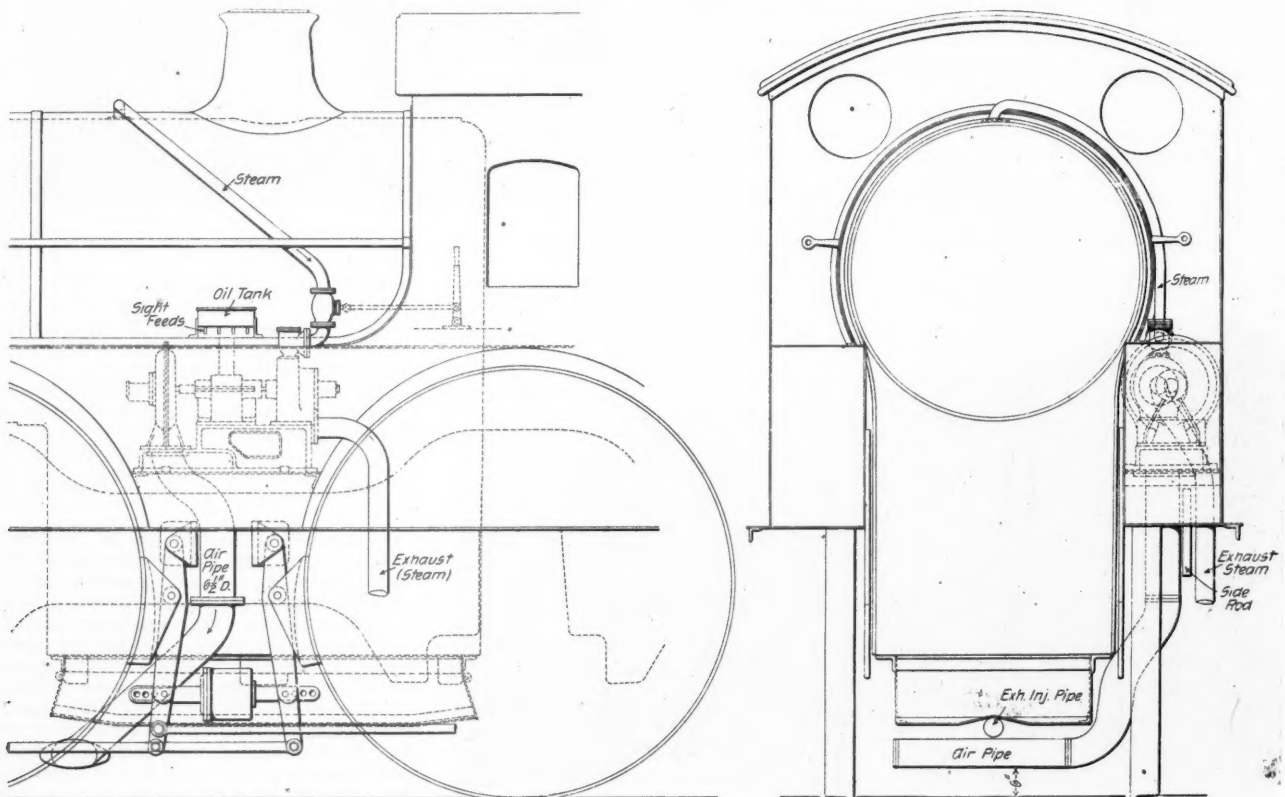
Air is forced in this casting, C, through the pipe, H, at a pressure sufficient to afford a somewhat stronger current than that coming through the fuel under the action of the exhaust.

This blast is made by a De Laval impulse steam turbine of about 3 horse-power, driving the fan direct. The whole combination of engine and fan is set under the running board, and the air is delivered to a pipe set across the firebox in front of the ashpan. In the illustrations the pipe, H, is brought in through the ashpan, although it is possible and perhaps preferable to cut an opening in the front water leg somewhat smaller, but of the same kind as the firedoor, and drive the air in that way. It is suggested that such an arrangement tends to increase the circulation through the cold water leg.

It will be seen that this stream of air is supplied in the form



Firebox Arrangement; Timmis Smoke and Spark Consuming System.



General Arrangement of Timmis Smoke and Spark Consuming System.

of a film at a point where it will be most efficient, as it passes over the edge of the arch and to the combustion chamber. It will be at a high temperature and in the best condition to complete the combustion of the gases and incandescent particles of fuel with which it comes in contact. In addition to this it has a cooling, and therefore preservative, action on the brick arch, while at the same time carrying a portion of its heat on to the tubes.

In the preliminary work that was done on an express locomotive, it was found that, while the device, as then applied, did reduce the sparks by about one-half it did not do away with them entirely. The area of the exhaust nozzle was then reduced with the result that the upward suction through the fuel was reduced and fewer sparks were torn from the fire, while those that were so loosened, as well as the smoke producing hydrocarbons, were consumed in the firebox.

The report of the performance of this locomotive says that the steam pressure is maintained much better than before, that the back pressure on the cylinders is reduced, and consequently the fuel consumption per mile run is much less. The advantages claimed are: The protection of the front tube sheet, the increase of life to the brick arch, the prevention of smoke, the saving of fuel, and the reduction of the back pressure in the cylinders.

Visible Supplies of Grain.

The following figures represent stocks of grain available at 62 of the principal points of accumulation east of the Rocky Mountains, stocks in Manitoba elevators, and stocks afloat on lakes and canals. Pacific coast stocks are shown only in the case of wheat.

Total Visible Supplies of Grain Available in the United States and Canada at the Dates Given, as Reported to Bradstreet's.

Dates.	Grain stocks east of Rocky Mountains.					Pac. Coast
	Wheat, bush.	Corn, bush.	Oats, bush.	Barley, bush.	Rye, bush.	Wheat, bush.
1900, Jan. 1	89,265,000	19,024,000	12,004,000	3,122,000	1,806,000	9,022,000
1901, Jan. 1	87,911,000	14,313,000	15,861,000	5,395,000	1,651,000	8,686,000
1902, Jan. 1	94,900,000	16,825,000	8,680,000	4,580,000	3,257,000	7,186,000
1903, Jan. 1	80,769,000	9,345,000	8,794,000	4,389,000	2,454,000	4,992,000
1904, Jan. 1	61,827,000	9,547,000	13,785,000	6,907,000	1,833,000	3,282,000
1905, Jan. 1	61,240,000	15,351,000	31,343,000	10,403,000	2,504,000	3,458,000
1906, Jan. 1	69,867,000	17,830,000	39,301,000	10,657,000	2,990,000	5,511,000
Feb. 1	73,151,000	22,010,000	35,791,000	8,526,000	2,857,000	5,295,000
Mar. 1	70,530,000	24,531,000	31,726,000	7,686,000	2,723,000	4,898,000
Apr. 1	66,599,000	17,653,000	28,006,000	6,567,000	2,452,000	4,621,000
May 1	54,856,000	7,674,000	22,033,000	4,251,000	1,954,000	3,917,000
June 1	40,347,000	7,366,000	12,785,000	2,053,000	1,734,000	3,349,000
July 1	33,810,000	12,017,000	10,020,000	1,620,000	1,544,000	2,586,000
Aug. 1	39,633,000	9,635,000	7,607,000	1,814,000	1,480,000	1,898,000
Sept. 1	43,611,000	4,760,000	13,241,000	1,244,000	1,629,000	1,943,000
Oct. 1	56,967,000	7,843,000	15,969,000	3,520,000	1,793,000	3,431,000
Nov. 1	45,694,000	6,492,000	12,275,000	4,476,000	1,906,000	3,459,000
Dec. 1	51,862,000	5,133,000	20,011,000	5,156,000	1,891,000	2,689,000
Dec. 8	52,115,000	5,804,000	19,873,000	3,931,000	1,759,000	.....
Dec. 15	56,008,000	6,642,000	18,883,000	5,210,000	1,800,000	.....
Dec. 22	55,998,000	7,619,000	18,504,000	4,714,000	2,005,000	.....
1907, Jan. 1	56,137,000	8,404,000	19,766,000	4,698,000	2,038,000	2,647,000

Elimination of Grade Crossings in New York State.

The following information about the work done in doing away with grade crossings in New York state is taken from an advance proof of the 24th annual report of the Board of Railroad Commissioners:

The Grade Crossing law provides:

1. That "all steam surface railroads, hereafter built, except additional switches and sidings, must be so constructed as to avoid all public crossings at grade, whenever practicable so to do * * * and the Board of Railroad Commissioners shall determine whether such crossings shall be under or over the proposed railroad, except where the Board shall determine such method of crossing to be impracticable."

2. That no new street, avenue or highway shall be constructed across a steam railroad except in a manner to be determined by the Board.

3. In section 62, a method for abolishing existing grade crossings of steam railroads.

The provisions of the act also apply to "all existing or future steam surface railroads, on which, after the passage of this act, electricity or some other agency than steam shall be substituted as a motive power."

The cost of building new steam railroads at grade or over or under the grade of streets, avenues or highways must be borne by the company. The cost of building new street, avenue or highway crossings at grade or over or under the grade of steam railroads must be borne, half by the company and half by the municipality. The cost of abolishing existing street, avenue or highway grade crossings of steam railroads must be borne, 50 per cent. by the company, 25 per cent. by the state and 25 per cent. by the municipal corporation.

The law also provides that "all steam railroads hereafter con-

structed across the tracks of any other railroad and any street surface railroad hereafter constructed across a steam railroad shall be above, below or at grade of such existing railroad as the Board of Railroad Commissioners shall determine, and such Board shall in such determination fix the proportion of expense of such crossing to be paid by each railroad." At many points in this state steam railroads cross each other at grade and while, under the railroad law, all trains and locomotives must come to a full stop before crossing unless the crossing is protected by an interlocking plant approved by the Board, still the dangers at such crossings where the interlocking plant does not exist are great. Even with interlocking there are dangers. This Board believes that section 36 should be amended by empowering this Board to order that in particular cases such crossings at grade of steam railroads must be changed from grade at the expense of the companies, this Board to apportion the expense between the companies.

In addition to the crossings changed from grade, under section 62 of the Grade Crossing law, crossings in Buffalo have been changed from grade under special acts applying to that city; crossings of the Long Island Railroad and of the Brooklyn Heights electric railroad in Brooklyn have been changed from grade under special acts; the Harlem River & Port Chester branch of the New York, New Haven & Hartford in its reconstruction has avoided grade crossings. There are now but two grade crossings of steam railroads left in Schenectady, the others having been changed to undercrossings, in the expense of which the state participates, and these two will be changed to undercrossings during the year. In the changing of its motive power to electricity, the New York Central & Hudson River contemplates the elimination of all grade crossings on its Hudson River division from Croton to New York and on its Harlem division from North White Plains to New York. The state is asked to participate in the cost of this work, and this Board has already made determinations under section 62 affecting the crossings in Yonkers. In the amendments to the good roads act of last winter, there is a provision as to the abolition of crossings where highways are to be improved, and while this amendment is indefinite in language it is at least a renewed determination by the state that grade crossings should be abolished.

The appropriations made by the state for the abolition of grade crossings began in 1898; in 1902 and 1903 no appropriations were made. Including a special appropriation of \$75,000 for Schenectady, the total is \$992,606.92. This is a comparatively small amount in view of the great number of crossings in the state, a table of which is published below this title. Massachusetts in 16 years has appropriated for this purpose \$10,000,000. It would seem that the state of New York should be as forward at least as Massachusetts in this work.

Following will be found a statement of every determination where a crossing was to be closed or changed from grade—made by the Board between June 30, 1905, and January 14, 1907, the date of the report:

1906.

1. Changing the Peek and Nott streets grade crossings of the New York Central in Schenectady to undergrade crossing. Plans, some specifications and an estimate of expense for this work have been submitted and approved.

2. Closing and discontinuance of a highway grade crossing of the Central New England, immediately east of the Pleasant Valley station in the town of Pleasant Valley, Dutchess County, and the construction of a new piece of highway to an existing highway crossing, immediately west of the station. The work is practically completed. No settlement of the cost has yet been made.

3. Closing and discontinuance of the country road or Old Forge road highway grade crossing of the Long Island Railroad in the Town of Riverhead, Suffolk County, and diverting travel by means of a new piece of highway to an overgrade crossing to be constructed at a point about 1,625 ft. east of the location of the existing grade crossing. A plan for this work has been approved and construction is now being prosecuted. There will be no expense to either the town or the state on account of this work.

4. Changing a highway grade crossing of the Delaware, Lackawanna & Western, in the town of Vestal, Broome County, to an undergrade crossing. Upon appeal, the courts of the state in an opinion reversed the order of the Board, the Board having determined that this work should be done. A new petition by the company has been filed.

5. Changing the North Portage street grade crossing of the New York, Chicago & St. Louis, in the village of Westfield, Chautauqua County, to an overgrade crossing. A plan for this work has been submitted.

6. Changing a grade crossing of the Highland division of the New York, New Haven & Hartford, in the town of South East, Putnam County, at a point known as the first grade crossing west of bridge over the Croton River at Brewster, to an undergrade crossing. This work is completed. The total expense was \$7,751.34. The state's proportion, which is in process of payment, was \$1,937.84.

7. Closing the John Hulse road grade crossing of the Long Island Railroad in the town of Brookhaven, Suffolk County, and diverting travel by means of existing highways to an undergrade crossing to be constructed about 3,450 ft. westerly from the Medford station. Plans, specifications, estimate of expense and the proposal of a contractor for the superstructure have been approved by the Board. Work of construction has been begun.

8. Closing the Hooker avenue grade crossing of the Syracuse, Binghamton & New York (D. L. & W.), in the village of Homer, Cortland County, and constructing an overgrade crossing of the railroad with approaches, the over-

grade crossing to be located about 125 ft. south of the existing grade crossing. This work is nearly finished.

9. Closing and discontinuance of the Rockefeller road grade crossing, and a portion of the approaches thereto, of the Delaware & Hudson, in the town of Bethlehem, Albany County, and constructing an overgrade crossing with requisite approaches at the first cut west of the grade crossing. Plans and specifications and an estimate have been approved.

10. Changing the Old Westbury road highway grade crossing of the Long Island Railroad in the town of North Hempstead, Nassau County, to an undergrade crossing. Plans for this work are now being prepared.

11. Changing the New York avenue highway grade crossing of the Long Island Railroad in the town of Huntington, Suffolk County, to an undergrade crossing with approaches. Plans for this work are now in course of preparation.

12. Closing the Long Swamp road highway grade crossing of the Long Island Railroad in the town of Brookhaven, Suffolk County, and diverting travel from it to the undergrade crossing to be built at New York-avenue (see preceding case) by means of a new highway. This work is involved with that to be done at New York avenue.

13. Closing the Fish or Thicket road highway grade crossing of the Long Island Railroad in the town of Brookhaven, Suffolk County, and diverting the traffic by means of a new highway to an undergrade crossing known as the Old Pine Neck road. Preliminary steps necessary to construct the new highway have been taken.

14. Closing the Horseblock road highway grade crossing of the Long Island Railroad in the town of Brookhaven, Suffolk County, and diverting the travel therefrom by existing highways to the next easterly grade crossing. This work has been completed without expense to either the state or the town.

15. Closing the River road highway grade crossing of the Long Island Railroad at Eastport in the town of Southampton, Suffolk County, and diverting the travel to an overgrade crossing to be constructed a short distance to the west of the present grade crossing. Plans, specifications and an estimate have been approved and construction has been begun.

16. Closing the West avenue grade crossing of the Erie, in the village of Livonia, Livingston County, and diverting the travel from it by means of existing and new highways to an overgrade crossing to be built about 800 ft. north of the present grade crossing. Plans, specifications and an estimate of expense have been approved.

17. Changing the Dock street, Wells avenue and Ashburton avenue grade crossings of the New York Central, in Yonkers, to undergrade crossings; the Pier and Fernbrook streets crossings to over-crossings; also changing the existing Main street overgrade crossing to an undergrade crossing and raising the existing Vark street and Babcock place overgrade crossings. Detail plans are now in course of preparation.

18. Changing the Canlsteo street grade crossing of the Erie in the City of Hornell to an underground crossing and constructing the necessary approaches thereto. Plans and specifications have been submitted for approval.

19. Closing the Tyrrell road grade crossing of the Rome, Watertown & Ogdensburg (N. Y. C. & H. R.), in the village of Wolcott, Wayne County, and diverting the travel by means of a new highway to a highway known as the Eastport Bay Creek road, which crosses the railroad at grade. Plans, specifications and an estimate of the expense have been submitted.

20. Closing the Roslyn road and Glen Cove Back road grade crossings of the Long Island Railroad in the town of Oyster Bay, Nassau County, and diverting the traffic by means of a series of new highways to an undergrade crossing to be constructed about 500 ft. north of the Greenvale station of the railroad. Plans, specifications, estimate and a proposal of a contractor for the superstructure have been approved, and construction is now under way.

21. Closing the Moreland road grade crossing (known as Beer's crossing) of the New York Central, in the town of Dix, Schuyler County, and diverting the travel by means of a new piece of highway to a new grade crossing to be constructed at a point just north of the Beaver Dams station of the railroad. None of the expense of this work is to be borne by either the state or the town.

22. Closing the Clay Pit road highway grade crossing of the Long Island Railroad in the town of Southampton, Suffolk County, and diverting the travel from it by means of a new piece of highway to an undergrade crossing to be constructed at a point about 200 ft. west of the present grade crossing. None of the expense of this work is to be borne by either the state or the town.

23. Closing the crossing of the Long Island Railroad by a highway known at North highway or Cherry Tree road in the town of Southampton, Suffolk County, and diverting the travel by means of new pieces of highway to an undergrade crossing to be built about 75 ft. east of the present grade crossing.

24. Closing the St. Andrews road highway grade crossing of the Long Island Railroad in the town of Southampton, Suffolk County, and diverting the travel by means of new pieces of highway to an undergrade crossing to be constructed at a point about 250 ft. east of the present grade crossing.

25. Changing the Culver road grade crossing of the New York Central, in Rochester, to an undergrade crossing. An estimate of the cost has been approved.

26. Changing the Grant avenue highway grade crossing of the Auburn branch of the New York Central in the town of Sennett, Cayuga County, to an overgrade crossing, constructing a new piece of highway from Grant avenue to the Phelps highway and closing the existing Phelps highway overgrade crossing.

27. Changing the New Scotland and Wolf Hill road grade crossing of the West Shore (N. Y. C. & H. R.), in the town of New Scotland, Albany County, to an undergrade crossing. Detail plans and specifications for this work are being prepared.

28. Changing the East Chemung street grade crossing of the Lehigh Valley in the village of Waverly to an overgrade crossing.

The following table shows the crossings of the various steam

railroads in the state, with streets and highways, and how protected:

Steam Railroad Crossings with Streets, Avenues and Highways.

As shown by reports for the year ended June 30, 1906.

Name of road.	Protected by—					
	Unprotected.	Gates.	Flagmen.	Both gates & flagmen.	Crossing alarm and signals.	Overgrade.
Albany & Hudson	35		1			
Bath & Hammondsport	12	1				
Boston & Maine	75	10	7		3	18
Brooklyn & Rockaway Beach	75	3				
Buffalo, Attica & Arcade	27					
Buffalo, Rochester & Pittsburgh	180		15	1	7	1
Buffalo & Susquehanna	16					1
Campbell Hall Connecting	4					1
Catskill Mountain	21		1			3
Catskill & Tannersville	5					1
Central Dock & Terminal						
Central New England	153		5	1	1	14
Champlain & St. Lawrence	1					
Cranberry Lake	2					
Dansville & Mount Morris	10					
Delaware & Eastern	9					
Delaware & Hudson	530	42	38		36	25
Delaware, Lackawanna & Western	305	44	56		62	30
Dunkirk, Allegheny Val. & Pittsburg	39		2		1	1
Elmira & Lake Ontario	124	2	5			1
Elmira & Williamsport	5					1
Erie	736	73	66	10	101	66
Fonda, Johnstown & Gloversville	41		4			1
Fulton Chain	4					
Genesee & Wyoming	14					1
Glenfield & Western	11					1
Greenwick & Johnsonville	1				25	1
Jamestown, Chautauqua & Lake Erie	18	2			4	1
Kanona & Prattsburgh	12					
Keesville, Ausable Chasm & L. Champ.	5					2
Lake Champlain & Moriah	6					1
Lake Shore & Michigan Southern	55		13	10	2	10
Lehigh & Hudson River	18	1				2
Lehigh Valley	606	24	30		10	29
Little Falls & Dolgeville	5					
Long Island	429		42	132	69	80
Lowville & Beaver River	13					
Middleburgh & Schoharie	3					
Middletown, Unionville & Water Gap	18		1		1	3
New Jersey & New York	34		1			3
New York Central & Hudson River	1,850	78	301	209	87	290
New York, Chicago & St. Louis	78	1	15		1	7
New York, New Haven & Hartford	11	13	1		1	37
New York, Ontario & Western	353	11	30		34	27
New York & Ottawa	34					1
New York & Pennsylvania	23					1
Niagara Junction	6					
Norwood & St. Lawrence	5					
Orange County	8					2
Otis						1
Owasco River		1	3			
Pittsburg, Shawmut & Northern	85					10
Poughkeepsie & Eastern	14		4			3
Raquette Lake	4					
Rochester, Charlotte & Manltou	3					
Rutland	163		3			10
St. Lawrence & Adirondack	8					1
Schoharie Valley	1					
Silver Lake	1					
Skaneateles	6					2
South Buffalo	1					
Staten Island	17		6	1	18	2
Staten Island Rapid Transit	3	3	10	11	14	3
Sterling Mountain	8					
Syracuse, Binghamton & New York	45	7	19		17	5
Terminal of Buffalo	11					4
Ulster & Delaware	113		11			8
Unadilla Valley	12					
United States & Canada	21					
Western New York & Pennsylvania	322	3	12	2	3	16
Total	6,793	320	722	397	501	714
						930

Foreign Railroad Notes.

The petroleum production of Galicia (Austrian Poland) has become so great that a special petroleum train has been put on between Cracow and Hamburg—almost into the jaws of the Standard Oil Company.

The Prussian State Railroads are prepared to contract for 15,800 freight cars to be delivered by the end of October next. Only those works which have heretofore supplied these railroads with cars, that is Prussian and Hessian works, are asked to bid.

The Baden State Railroads purpose next winter to establish classes of instruction in French and English for employees engaged in receiving and forwarding freight and for passenger conductors and guards.

What is doubtless the longest 2-ft. gage railroad in the world has been completed this year in German Southwest Africa from the Atlantic at Swakopmund (about 21 south latitude) northeast 358 miles to Tsumeb. It is known as the Otavi Railroad, Otavi being an important mining district about 150 miles from the coast. Tsumeb, the new terminus, has mines so important that an aqueduct 14 miles long has been built to bring water to them. The Arthur Koppel firm built the road, which was opened for traffic November 12.

Transatlantic Passenger Traffic in 1906.

The annual report of the landing agent at Ellis Island, New York City, shows that during 1906 the transatlantic steamship lines landed 1,159,551 passengers at New York, an increase of 167,486 over 1905. The proportion of aliens to United States citizens was as follows:

	Aliens		U.S. Citizens	
	1906.	1905.	1906.	1905.
Cabin	133,964	104,078	84,756	107,375
Steorage	910,558	754,346	30,273	25,666

The following table shows totals for the past six years:

Year.	Trips.	Cabin		Steorage.
		First.	Second.	
1906.....	1,097	84,435	134,285	940,831
1905.....	...	104,965	107,088	780,012
1904.....	967	68,704	93,685	572,798
1903.....	956	67,719	93,557	642,959
1902.....	922	.....	.....	574,276
1901.....	888	.....	.....	403,491

The traffic on individual lines was as follows:

Line.	1906. Trips.	Cabin		Steorage
		First.	Second.	
American, Southampton	52	5,786	8,328	26,611
Anchor, Glasgow	50	2,903	12,407	23,642
Anchor, Mediterranean	26	263	.....	25,827
Atlantic Transport, London	48	3,499	25	102
Austro-American, Trieste	18	133	238	15,369
Cia. Transatlantica, Mediterranean	12	390	561	6,518
Cunard, Liverpool	69	9,190	13,940	62,547
Cunard, Mediterranean	27	1,030	2,452	50,804
Fabre, Mediterranean	30	237	.....	33,165
French, Havre	79	5,884	9,028	62,311
Hamburg-American, Hamburg	104	13,494	16,018	128,811
Hamburg-American, Mediterranean	23	1,207	1,757	24,402
Holland-America, Rotterdam	45	3,868	10,215	42,951
Lamport & Holt, Santos	20	581	.....	1,312
La Veloce, Mediterranean	24	691	245	28,944
Nav. Gen. Italiana, Mediterranean	34	354	1,602	38,149
North-German Lloyd, Bremen	95	12,796	23,992	101,936
North-German Lloyd, Mediterranean	33	2,770	5,570	47,459
Prince, Mediterranean	16	91	5	16,051
Red Star, Antwerp	58	3,609	9,501	64,631
Scandinavian-American, Copenhagen	32	1,416	2,693	17,366
White Star, Liverpool	99	11,978	12,949	49,453
White Star, Mediterranean	15	1,285	2,893	25,960
Miscellaneous, various ports	50	908	70	4,947
Russian Volunteer Fleet, Libau	5	25	.....	5,207
Russian East Asiatic, Libau	5	142	106	2,563
Impresa Insulane, Lisbon	2	33	.....	750
Austro-American, Trieste	18	133	238	15,369
Richard & Co.	23	220	290	14,356
Phelps Bros. & Co.	23	220	290	14,356

Railroad Conditions in the South.

President Finley, of the Southern Railway, addressed the following circular, under date of January 16, to the public served by his company:

Realizing, from our own point of view and from public expression, the importance of the work of this company, especially in the South, and the fiduciary relationship which it bears to its patrons and to the public, I desire to make a brief statement of some of the conditions which confront it, and of the purposes and policy of its management. The management would not ignore the fact that at present railroad service generally, including that of the Southern, is far from satisfactory. If there was no adequate and justifying cause for this, these conditions would be unpardonable, but the fact is, they spring largely from causes which cannot for the moment be controlled. One exceedingly potential cause is the extraordinary industrial development of the South. In his last public address, the late President of the company, Mr. Samuel Spencer, referred to this development as follows:

"The South has entered upon a period of increased production in agriculture and in manufactures, and of general industrial and commercial activity, such as her best friends and most enthusiastic prophets had scarcely dreamed of fifteen years ago. Within that period the cash value of her cotton crop has doubled, the amount of pig iron produced at her furnaces has increased enormously, and the product of her coal mines has increased more than three-fold. Cotton factories have sprung up within her borders to the extent that more of her cotton crop is now manufactured on her own soil than in all the mills of New England. The total value of her annual manufactures now aggregates nearly eighteen hundred millions in value. The total value of her agricultural products is now over seventeen hundred millions per annum."

This increase is likewise indicated in the volume of traffic handled by this company. In 1895 the number of tons of freight carried one mile was 1,098,932,884, while in 1906 the number of tons carried one mile was 4,488,915,839, showing an increase of over 300 per cent., or, allowing for the increased mileage, an increase of over 138 per cent., while in 1895 the number of passengers hauled one mile was 178,015,925, as against 549,518,645 in 1906, showing an increase of over 200 per cent., or, allowing for the increased mileage, an increase per mile of road of over 80 per cent.

Nowhere in the United States, except in the two states of the extreme Northwest, Washington and Oregon, has there been such industrial development as in the South. It is perhaps not too much to claim that, outside of the energies and efforts of the people themselves, this company has been one of the chief factors in this

development. Manifestly, the vast increase of traffic incident to this commercial awakening requires enormous increases in transportation facilities.

The management of the Southern Railway Company has not been unmindful of this fact, and did not wait for the coming of the development itself before attempting to increase to the most possible extent its transportation capacity. It must be remembered that this company has not been in existence more than about 12 years. It found those railroads of the South, now constituting a part of its system, of light and faulty construction, poorly equipped and utterly unprepared to handle any considerable traffic. They had been recently bankrupt and were without credit.

As soon as the new company came into existence, the management adopted a policy of betterment and improvement, and something of what it has done to prepare for the traffic of the South will appear from the following statement. It has spent:

In new, approved and heavier rail	\$10,880,000
In double tracking, reducing grades and changing alignment	6,942,631
In new steel bridges for heavier power	2,578,540
In branches and spurs to industries	2,363,288
In side, passing and commercial tracks	3,148,806
In shops, tools and machinery	2,041,148
In additions and improvements to yards, real estate, roadway and structures and other improvements and additions	8,229,005
Or a total of	\$36,184,018

It has spent or contracted to spend:

For new equipment	\$49,322,569
For joint terminals complete (its proportion)	3,408,188
For terminals	823,401
For double tracking	6,744,769

Making a total of work done and contracted for to prepare to handle the traffic

It has increased its rolling stock as follows:

Locomotives, from 623 to (received and contracted for), 1,544.	
Freight train cars from 18,924 to (received and contracted for), 58,401.	
Passenger train cars from 487 to (received and contracted for), 1,008.	

This does not indicate fully the increase made to its equipment by the company, because the increased power of the locomotives, and the increased tonnage capacity of the cars have added much more to the equipment capacity of the company than the number of added units would represent. For example, the average capacity of the freight cars has increased 28.38 per cent.

A fair consideration of these figures will demonstrate the fact that the management of this company has not been unmindful of its obligation to increase its facilities in anticipation of the increase in traffic.

It has been, and still is, hampered, however, by two conditions: One is the large amount of fresh capital required; and, the other, the difficulty of securing adequate and efficient labor, of promptly getting its construction work done, and of obtaining the rolling stock, rail and other material essential to improved facilities.

Delay incident to obtaining rolling stock will be illustrated by the following:

On November 1, 1905, contract was made for 98 locomotives and 1,806 freight cars to be delivered in February and March, 1906. There are still undelivered 177 freight cars.

On February 1, 1906, contract was made for 100 locomotives and 10,000 freight cars to be delivered on or before October, 1906. Still undelivered, 17 locomotives and 2,218 freight cars.

The disappointing delay in construction work will be illustrated by the following:

The double track work on the main line between Pomona and Spencer, N. C., was all let during the year 1905, and the last of it should have been completed by November 30, 1906. Part of this work is ten months late and the rest of it will be approximately five months late. This delay is due to the difficulty of the contractors in getting labor and material.

The contracts for the double track work between Knoxville and Morristown, Tenn., were let in September, 1905, and April, 1906. That part of the work which should have been completed to date is approximately 10 months late. This delay is due to the inability of the contractors to get labor promptly.

The double track work between Peyton and Austell, Ga., the contract for which was let in April, 1905, and which should have been completed in February, 1906, will be more than 14 months late in completion. This delay is due to scarcity of labor and material.

The prosecution of this double track work has necessarily caused some of the delay to the traffic of which the public complains, and necessarily results to the company in increased cost of operation. The fact that the company, in its effort to improve its facilities to handle the public business, has not been deterred from undertaking this work at a time when the cost of materials and labor is on such an unusually high plane should, I think, be accepted by the public as an earnest of the company's desire and purpose to put itself in a position to perform acceptably its public duties.

One of the greatest needs of the South is that its railroads should have additional track capacity. No matter how many locomotives and cars may be available, it is manifest that the number

which can be moved is limited by the track capacity. The work of providing the necessary additional track will require a vast input of capital. How it is to be provided, is everywhere a matter of grave concern to railroad managers. It cannot be obtained from the current operations of the properties. It must be borrowed.

Looking forward to the need for largely increased facilities, the management last spring authorized the creation of the company's development and general mortgage bonds to the amount of \$200,000,000. Of these bonds, \$20,000,000 were at once sold, and the proceeds are being spent as rapidly as the work can be done in adding to the existing facilities of the company. It is the intention of the management to pursue this policy and provide such of these additional facilities as may be required to meet the growing demands of business.

As bearing upon the capacity of the railroad companies to obtain the means to make necessary additions to their facilities and to provide the most approved safety appliances in operation, the public should give fair business consideration to the situation which confronts the carriers.

The present situation is:

An immense increase in all expenses, without any increase in rates—in fact, with the proposition almost universally made to decrease rates by legislative action.

The large increase in expenses may be illustrated as follows. Since 1898:

Bridge timber has increased from \$9.36 to \$20.52 per thousand feet.
Cross ties from 28 cents to 34.5 cents per tie.
Steel rails from \$17.75 per ton to \$28.00 per ton.

Since 1898, prices of equipment have increased as follows:

Locomotives from \$11,392 to from \$16,000 to \$20,000.

Passenger coaches from \$6,315 to \$9,468.

Freight cars from \$509.43 to \$765.00.

Coal cars from \$368.00 to \$1,135.00.

The cost of labor has increased per mile of road from \$1,621.67 in 1903, to \$2,874.71 in 1906; and from \$2,513.64 per mile of road in 1905 to \$2,874.71.

Taxes of the Company per mile of road have since 1895, increased 63.41 per cent.

To this large increase of expense must be added the excessive verdicts of juries in personal injury cases. In addition to this there is a marked tendency on the part of many of the states to regard any failure of service as wilful, and to impose upon the carrier a heavy penalty therefor.

Inasmuch as adequate facilities for all are not in existence, the imposition of a penalty for failure to furnish cars under the above mentioned circumstances, if it has any effect other than merely to deplete the treasury of the carrier and to deprive it to that extent of the power to improve its transportation and service, must result simply in the withdrawal of the carrier's facilities from the service in respect to which there is no penalty, in order to use them in the service where there is a penalty. The logical result of this would be a race between the states to see which could inflict the highest penalty so as to obtain a preference for its own citizens.

The imposition of penalties will not build railroad tracks, supply equipment, or enlarge and simplify terminals, nor would it, under the circumstances mentioned, benefit the transportation service as a whole but, on the contrary, would tend to produce injustice and discrimination between persons and localities. Besides, this naturally would develop into a preference in favor of state commerce over interstate commerce. But the large interests of the shipping public of the South are in interstate commerce for the reason that their principal markets are the larger markets of the country, which are in other states.

That this condition is appreciated by the shipper will be apparent from the following quotation from a letter just received from a large shipper:

"Practically all our shipments go out of the state; therefore, we cannot use Form 41 (a form used for the purpose of availing of the penalty laws of the state), consequently orders for shipments within the state when shippers use Form 41 are given preference."

It is not to be wondered at that the large increase in the cost of materials, equipment and labor and other expenses above adverted to, and the increased difficulties in transportation are, as shown by its published reports, reflected in a large decrease of the net earnings of the company since July 1, 1906, notwithstanding its increased gross earnings.

With these greatly increased expenses for material, for labor,

for taxes, for penalties and for damage claims, and with the just demands of the public for better facilities and greater safety of operation, it must be apparent that a reduction of revenues must conflict with the public interest in these larger questions of better facilities and greater safety.

I submit these facts to the candid consideration of those people who, in perfect good faith, desire a reduction of our freight rates and passenger fares. The public should be advised that, with decreased revenues, the railroads of the country will be utterly unable to pursue successfully their efforts to provide better facilities and greater safety of transportation.

The point is near where it may be absolutely necessary for the public to take the choice between better and safer facilities on the one hand and lower rates on the other. In the nature of things, it is impossible to provide both.

In view of the difficulty of meeting the just demands of the public for larger facilities and greater safety, with reduced revenues and increased expenses, I feel that I am justified in laying before our patrons and the public this plain statement of conditions.

W. W. FINLEY,

President.

Rotary Snow Plow for the Denver, North-Western & Pacific.

In the third of the winter already past, the difficulties of railroads in the Northwest on account of snow and ice have been the greatest in 10 years. Not that there have been tremendously heavy falls of snow; but a succession of severe snow storms following each other so closely that the lines have been blocked almost as soon as opened. In keeping the tracks open, rotary snow plows play a most important part. In the *Railroad Gazette* of Dec. 28, 1906, two photographs were shown of a rotary snow plow in use on the Denver, North-Western & Pacific. As this road by its present line crosses the continental divide west of Denver at 11,600 ft. above sea level, an altitude at which there is usually snow all the year



Rotary Snow Plow of the Denver, North-Western & Pacific.

around, there must be most powerful machines for attacking snow and ice during the winter months. The accompanying photograph shows more in detail another of the rotary snow plows built for the Moffat road by the American Locomotive Company at its Cooke works. These are the largest rotary snow plows ever built. One of the other photographs shows one of the plows at work and the other a cut made by one of these plows with the clear rail left behind the plow.

Work of this sort used to be done by the wedge plow which, with six or seven locomotives behind it, bucked heavy drifts, forcing its way through by sheer force if possible. This was not always possible and was always dangerous to the men, among whom were many accidents. The rotary does the work without danger to equipment or men, and with uniform success. It will bore its way through drifts packed in a hard icy mass with perfect safety to those operating it. One or two heavy consolidation locomotives are all that are needed for pushing. The rotary for the Moffat road will clear a cut 13 ft. 4 in. wide. The wheel consists of 10 cone-shaped

scoops fitted with knives which adjust themselves automatically into cutting position. The wheel is encased in a drum, which is provided with a reversible hood, operated by an air cylinder, so that the hood may be turned to either side to suit the direction in which the wheel is turning. The boiler is of the locomotive type with Belpaire firebox. The engine consists of two horizontal cylinders with slide valves operated by the Walschaert valve gear. The plow is carried on a steel I-beam frame and is mounted on two 4-wheel steel frame trucks. To prevent derailment of the plow the front truck has ice cutters and flanges. The ice cutters are attached to a frame hung on the forward end of the front truck and operated

Railroading in the Forties.

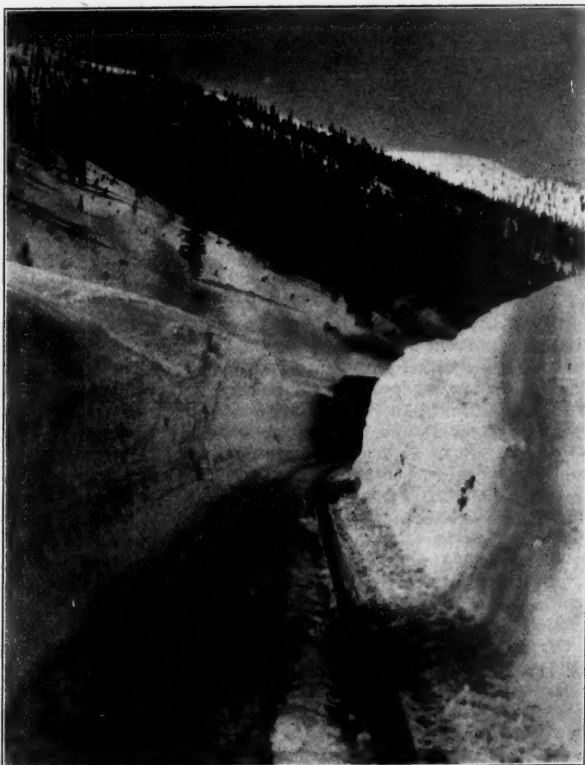
About the year 1840 the Housatonic Railroad (now part of the N. Y., N. H. & H.) was in operation from Bridgeport, Conn., to West Stockbridge, Mass., connecting with the Hudson & Berkshire for Hudson and Albany, and from Bridgeport to New York by steamboat. It is one of the oldest of our railroads, so old, in fact, that it goes back to the days of the strap rail; which, as older readers will remember, consisted of longitudinal sills of wood laid on ties, and to these sills iron straps with holes in their centers were spiked. Great care on part of the track gangs was needed, as the spikes were



The Rotary Bucking a Deep Snow Drift in the Rockies.

by an air cylinder, so that it may be raised and lowered in crossing frogs or switches. The flanges are hung in the rear of the truck and connected to the axle, and are also operated by an air cylinder. With the ice cutter and flanger in perfect working order, it is impossible for the rotary to be derailed by ice or snow.

The rotary has been used for the past 20 years, and successful operation in winter of many of the lines crossing the Rockies has depended on it for fighting the snow.



The Canyon of the Rotary.

continually loosening, and when this occurred at the ends of the straps they curled up and formed what were called "Snake Heads." When a train struck one of these a derailment was generally the consequence, or if by good luck the engine passed safely, perhaps a car truck might strip the iron from the sill and force the iron through the floor of the car, so that it was thought to be unsafe to ride over the trucks; and to this day, so strong is tradition, that old-fashioned people prefer the middle seats in the coaches.

The rolling stock was of the simplest. The passenger cars were flat roofed, with small windows divided into four panes and only the lower half could be raised. The seats were covered with hair cloth, illumination was by candles, and link and pin couplings and hand-brakes were used. Those who saw the "John Bull" train at the Chicago Exposition in 1893 will recognize the type of cars. The trucks were built with wooden frames and cast-iron pedestals with a wheel base of about four feet, and frequently the springs were rubber blocks; about as comfortable as a "dead ex" wagon. Coaches of the English type were used on the Hudson & Berkshire as late as 1842-3, and the freight cars were of the four-wheeled type, like the English wagons of to-day. The engines were Rogers, Ketchum & Grosvenor make, small affairs of 15 to 20 tons weight, with outside cylinders 10 in. to 14 in. in diameter, mostly of the American type, though some had only one pair of drivers, and one (the "Berkshire") had the main rods coupled to the rear drivers. The boilers were all of the same construction, with dome topped round fire-boxes—wood burners of course—with stacks of all shapes, contrived so as to arrest, as far as possible, the escape of sparks, but this was only partially done, as the eye of many a traveler can testify. Valve gears were all of V hook variety generally with an auxiliary cut-off set at half stroke. Two of the freight engines had no cut-off and practically worked full stroke all the time.

Strange as these machines would seem to modern practice, they were far ahead of the Hinckly and Drury engines used at that time on the Western roads, which, with their complication of cam shafts, starting bars, cut-offs, etc., requiring some five or six levers in the cab to be handled, would certainly puzzle an engineman of to-day were he told to get aboard and do some switching. But these old worthies have all passed away; the last one the writer remembers was the "New Orleans," an ex-passenger engine doing service on a contractor's train on the Hoosac tunnel route about 1868. What a pity that some of these are not in our museums rather than in the scrap heaps. Fortunately we have the "John Bull" in Washington.

In those early days despatching was unknown; there was no telegraph and trains were run by dead reckoning. A meeting place was determined, and in case of failure of either train to arrive on time the train having the right of way would, after allowing five minutes for variation of watches, "proceed with care" till it met the

other train. In spite of the want of modern facilities, collisions were no more frequent than they are in these days of lap-orders and unheeded block signals.

About 1845 the telegraph came into use and the writer well remembers hearing an uncle announce "the Park Theatre in New York is burning at this moment and we, 160 miles away, know it—is it not wonderful?"

Previous to the telegraph the distribution of very important news, especially the President's messages, was made by running engines having the track cleared for them, with copies of the messages tied to wooden billets which were dropped at the station as the engines whizzed by at possibly 30 miles an hour. It was a red letter day for the gentlemen of leisure in the various towns to gather at the stations in larger force than usual to see the engines pass without stopping! There were no express trains then. All trains stopped at all stations and there were no complaints of discrimination.

Before 1850 the road was laid with T iron spiked to the ties and without splice-bars or any provision for securing good joints. Later this was corrected by using "chairs" at the joints, which introduced a new evil, the brooming of the rail ends.

About 1850 the Waterbury ventilator for passenger cars was put in use and continued for some years to be of service. Wings or scoops were built out on the sides of the tender tanks which forced the air back whence it passed down through the double roof of the baggage car and through the body of the train and out at the rear. Vestibules, practically same as now used, were provided on both baggage and other cars so that the train was virtually a tube through which the air was in circulation, so long as the train was in motion. For the short trains of those days, rarely more than three cars, the plan worked successfully. Why is it, with all our modern appliances for comfort, this matter of ventilation, or rather want of it, has received so little attention? Really we are not as well off as travelers of 50 years ago. Possibly the use of electric locomotives with their freedom from smoke and cinders may permit the introduction of pure air into our modern air-tight palace coaches. May we live to see that day.

J. H. A.

Putting the Italian Railroads in Order.

The following translation from *L'Ingegneria Ferroviaria* discusses the efforts now being made in Italy to remedy the defects in railroad operation and administration. With the promulgation of the three decrees providing for urgent needs of construction and material, for regulation of the personnel and for buying in the railroads operated by the Southern Railway (*Società delle Meridionali*), the life of the state railroad administration enters upon a new phase—that of regulation, or, to use a more familiar idiom, of putting in order. Last year may be considered as the transition period from the old to the new; a year in which the full effect was felt of the sudden and confused change. The transportation crisis which resulted, the bitter recriminations of the public, the unjust suspicions of obstructionism indulged in by the higher officials, eager to return to private ownership because of perquisites and dividends—these will certainly never recur, and we do not repent at all that we have been invariably optimistic.

All railroad officials, even those in the lower grades of the hierarchy, are in a position to appreciate the immense difficulties which have had to be overcome; and they must rejoice that, with the withdrawal of every outside obstacle, the period is beginning in which, under the tranquil conditions so much needed by the railroads and the public, the service may develop with the necessary regularity, and the administration may be definitely systematized. And it will be well to devote a few words to this task of systematization. The initiation of our state railroad management takes place during a great revival of business activity, and hence under favorable conditions for securing traffic. Nothing better can be wished than the chance to inaugurate an administration which, willy nilly, has abundance of business and fairly adequate resources. Yet we must not forget that, in general, lean years follow fat ones, and that the administration must be planned on a basis of medium traffic, not according to these exceptional years. The private companies were, to a greater or less degree, very expensively organized, perhaps because of the operation contracts, which necessitated superfluous office labor; this organic defect, which has probably been aggravated during its adoption in the new administration, is now being investigated. There have been too many superior officers and too much red tape. The government has also had to modify its original plan of department headquarters and a central headquarters, by depriving the former of much of the nominal independence which they enjoyed but seemed incapable, perhaps through lack of competent men, of exercising intelligently. It is too much to expect that administrative ability will be brought forth immediately; time and especially a campaign of education are needed, the state using for the latter the most solicitous care and stringent justice in making promotions, encouraging energy and rewarding ambition.

National Characteristics in Locomotive Building.

In the *Railroad Gazette*, July 6, 1906, a review was published of *La Locomotive Actuelle*, by Maurice Demoulin, in which a reference was made to the outline of the national characteristics of the locomotives in use in the several countries of the world. A translated abstract of this summary is here given:

Germany.—The design of German locomotives was practically stationary for a long period which offers little of interest except in an academic way. But the transformation, which has taken place in the past decade in nearly all countries, has been especially noticeable in certain states of the German Empire. This is particularly the case in Baden and Bavaria, and there are now a number of powerful types of locomotives in Germany that are of interest, in which American influence is frequently manifest, although the details have been worked out with a greater regard to lightness because of the limit of 15 tons which has been fixed for the weight that can be imposed on one axle.

The application of the compound principle to the locomotive, although originating in France, was developed in Germany in the two-cylinder type more rapidly than in France, where compounding made little progress until the introduction of the four-cylinder system on some of the main lines. This latter type has also been extensively applied in Germany, although, at the instigation of the *Société Alsacienne*, it has been modified and applied in a different form. At the present time, however, compounding, at least in Prussia, is no longer a dominant idea, but the use of superheated steam has become the question of the hour with the idea of revitalizing the simple engine in a country where, except in certain types of suburban locomotives, it had almost disappeared. The future will show whether such an evolution can be brought about, but it seems doubtful if superheating will altogether replace compounding.

The weight of trains has been very materially increased in Germany in recent years, but the speeds, in spite of the progress that has been made, are far from being as high, on the average throughout the country, as they are in France and England. The German time tables show only a few runs made at an average speed of 53 miles an hour.

The four-wheeled coupled (4-4-0) locomotive with a bogie, is extensively used and may be considered the standard type for Prussia. But they are notoriously insufficient for their work and the Atlantic (4-4-2) and ten-wheel (4-6-0) types are gradually supplanting them. The Atlantic type locomotives, with the exception of some recent engines built for the Bavarian State Railroads, have wide fireboxes. Some of them are very powerful. The locomotives of this type, belonging to the State Railways of Baden have a grate area, for example, of 41.64 sq. ft. These locomotives have a total weight of from 60 to 74 tons, while the weight on the driving wheels is only 32 tons. These may be compared with the Atlantic type locomotives of the Orleans Railway of France, which have a total weight in working order of 73 tons, with 36 tons on the drivers, or with the English locomotives of the same type which have a total weight of from 65 to 73 tons, of which from 37 to 40 tons is on the driving wheels.

The (4-6-0) type of six-coupled engine with bogie truck having driving wheels from 70 to 80 inches in diameter is the favorite one in Germany and is extensively used. The weight on the axles being limited to 16 tons, and the use of cars with a high tractive resistance makes the starting less easy than with the rolling stock used in France. The same type, with wheels 63 to 67 inches in diameter, will probably replace the mogul (2-6-0) type in the future and is already in use on the State Railroads of Prussia.

Freight trains are usually hauled by mogul (2-6-0) locomotives having wheels from 54 to 64 inches in diameter, those having the largest wheels really forming a class for mixed service, but sometimes used for heavy passenger trains. Eight-coupled engines are also used for freight trains. Suburban trains are hauled with engines having tenders and belonging to a great number of types.

Recent German locomotives are built for a boiler pressure of from 165 to 180 lbs. per sq. in. and are fitted with suspended fireboxes (the Belpaire firebox is only used upon a few locomotives built by the *Société Alsacienne* or from its plans) and cylindrical smokeboxes. Serve tubes have only been used in an experimental way, except in Alsace Lorraine. The extended firebox is being more and more extensively used and, in addition to its application on the Atlantic type locomotives of the Baden roads, it is used on the Palatinate and the Prussian State Railroads.

The cylinders and machinery are always on the outside; inside machinery being found only on the four-cylinder engines. The moving parts are usually light; the cranks are always hollowed. Piston valves are extensively used and exclusively so on locomotives with superheaters. Balanced flat valves are also frequently used. The valve motion is of the Walschaert type known as the Heusinger in Germany. The Joy gear is also used on some machines. The frames are always on the inside even for the bogie with the exception of some locomotives built by the *Société Alsacienne*. They

are usually strongly braced. The wheels are of cast steel and some axles are of nickel steel. Equalizers for suspension are in common use, but rarely for all of the axles.

Most of the locomotives on the main lines are of the compound type, with either two or four cylinders, with the exception of some recently built for the State Railroad of Prussia, a considerable number of which are furnished with the superheaters, that in most common use being of the Schmidt type. In 1898 the two-cylinder type of the Von Borries and Lindner systems with others of the same class were the only ones in use. Since that time many four-cylinder locomotives have been built, most of them of the Battery type for the State Railroads of Prussia, Baden, Bavaria and the Palatinate; but the Société Alsacienne has built large numbers of the Du Glehn type or modifications of it, especially for the roads of Alsace-Lorraine.

The German types of four-cylinder compound locomotives have no arrangement for starting other than the introduction of live steam at a reduced pressure, into the intermediate receiver. In many cases this introduction is regulated by an automatic device formed by a cock attached to the lifting shaft so that it is open when the valve motion is at the end of its stroke for starting and is closed as it is hooked back into the running position. The German engines are fitted with bar throttles and inside dry pipes, with safety valves loaded direct and, for the past few years, with American pop valves. The brick arch is more and more extensively used. The variable exhaust is as yet found only on the engines of the Baden State Railway and those of Alsace-Lorraine. German builders are taking greater and greater care in the matter of general appearance of their engines. The Maffei and Borsig shops have both recently put out engines of remarkable symmetry and simplicity in external appearance.

Austria.—The Austrian locomotives that have been built during the past twelve years are all very similar to each other in appearance, whether they belong to the State Railway or the private companies, among which are, the Empereur Ferdinand, Nord-Quest, Sud de l'Autriche, etc. They are fitted with some special arrangements and belong to a school of their own. Although having characteristics common with other continental locomotives, they will be seen at first sight to be different. The locomotives of the Hungarian State Railroad are coming to show less and less decided differences when compared with those of the Austrian roads.

The design of these machines is controlled by the following considerations: to haul heavy trains, some of which are quite fast, over lines with a difficult profile, keeping the load on each driving axle between 14 tons and 15.5 tons at a maximum, according to the road, and the burning of an inferior fuel. This is frequently tan bark of local production or even lignites, which only give an evaporation of from four to five pounds of water per pound of fuel. Consequently large grates which rarely are less than 30 sq. ft. in area and which are often as large as 43 sq. ft. are in use. This frequently involves the use of extended fireboxes or at least those that are quite wide. This has also led to the development of locomotives with five axles and of the six-wheel coupled type for passenger trains and of the mogul, consolidation and ten-wheel coupled types for freight service or for use on grades. The 4-4-0 and 4-4-2 types are widely used for the level roads, although the weight on the drivers is seldom more than 29 tons. The limit of weight per axle is 15 tons and this often involves the use of unsymmetrical arrangements that do not create a good impression at first sight, as for example the rather unusual position given to the bogies in which they are set well to the rear in order to relieve the coupled wheels.

The boilers are built for pressures of from 158 to 170 lbs. per sq. in. They are fitted, almost without exception, with suspended fireboxes held by staybolts, with a flat crown sheet, and a cylindrical smokebox. Many of them are fitted with two domes connected by a large horizontal pipe. This arrangement, which was applied until recently to the locomotives of all types, was adopted to increase the steam space and to distribute the draft for the cylinders over two points some distance apart in the boiler. The continuance of this custom has not been possible with the high engines recently built on account of the limited clearances of the Austrian roads and has therefore been abandoned for more modern construction. Austria was the first European country in which the center of the boiler was raised to any great height, 9 ft. 2 in. being a common height, and even that is frequently exceeded. The Austrian locomotives, however, do not appear as high as they really are on account of the length to which they are obliged to limit the stacks because of the overhead clearance.

The outside frame formerly so extensively used has been abandoned. The advantages which it offered, such as the possible enlargement of the firebox, were offset by numerous disadvantages, the principal of which is the increase of the transverse distance from center to center of the outside cylinders. The trucks, whether articulated or with radial axles are always fitted with inside boxes even when the frames of the engine itself are on the outside.

The Golsdorf system of two-cylinder compounding is almost uni-

versally used. Lately, however, several types of four-cylinder engines have been built. The cylinders are outside save for a few exceptional types and the valve gear is always upon the outside and invariably of the Walschaert design. The machinery is well designed and exceedingly light. The main crank pin and the side rod pins are always hollow.

The throttle is of the goose neck type and is invariably placed in the forward dome and operated by a vertical lever whose shaft comes out of the dome on the right hand side and is attached to the reverse handle by a bell crank which sometimes also serves for operating it. The safety valves are frequently balanced and are placed on the dome, or, when the machine is very high, upon the pipe connecting the two domes. The most recent engines have directly loaded valves only, which are placed on the dome or at the rear of the back dome. American pop safety valves are occasionally used.

The stacks are either truncated cones or are cylinders, are frequently of cast iron, and are ordinarily bolted to a base riveted to the smokebox by means of a flange which gives an unsymmetrical appearance. The sand boxes are usually placed on the running board, on each side, but sometimes they are on the shell between the domes and are pierced by a steam pipe which holds them together and dries the sand.

The locomotives are usually provided with a variable exhaust. They are all provided with cabs made of sheet metal which are very complete, an item that the severity of the climate renders necessary.

Austrian locomotives are powerful and well built and were fitted with bogie and Bissel trucks before those of most of the countries of continental Europe. They represent the result of an effort toward constant and progressive improvement. Formerly, adverse criticism might have been made regarding the unsymmetrical appearance, the complication and the hard riding of Austrian locomotives, but the most recent Atlantic and Prairie type engines of the State Railroads have been so much improved in this respect that they are now among the most simple in appearance and most satisfactory in action of the locomotives of continental Europe.

Italy.—The Italian roads have rolling stock that is interesting, presenting, as it does, traces of foreign influence that are very marked, together with original characteristics which differentiate it at first sight from that of other nations. Italian rolling stock of the best type is quite modern; there will be found numerous examples of the genuine spirit of research and innovation and of a progress that has been very rapid. Furthermore, it must not be forgotten that Italy was the first country of continental Europe where the bogie truck was extensively used and where a six-wheel coupled locomotive was employed in high-speed service.

Recent Italian locomotives have boilers with a large capacity and Crampton fireboxes. They are frequently extended and are always somewhat widened at least. The two-cylinder compound system is the one commonly used; the Mediterranean system has a few three-cylinder engines and the Adriatic several of the four-cylinder type.

France.—General increase in power, standardization of types of locomotives and the extensive use of four-cylinder compounds constitute the most salient points of current French practice. The increase in power has been rapid and was brought about by the increase in tonnage and speed of trains. Although the limit of weight permitted on each axle, ranging as it does from 17 to 18 tons, according to the railroad, is somewhat higher than that allowed in other countries of continental Europe, it is not as high as in England, where it is from 19 to 20 tons, or in the United States, where it ranges from 24 to 26 tons. Still French builders are obliged to study their details carefully in order to keep within the limits imposed. The nominal speed of the fast trains in France is high, from 53 to 60 miles an hour on most of the systems, counting the time from terminal to terminal. Some trains on long sections without stops attain an average speed of 59 to 62 miles an hour, deducting the time for intermediate stops. The locomotives used for these services haul, under these conditions, from 200 to 300 tons behind the tender and sometimes 350 tons. The most powerful among them have hauled 350 net tons on a continuous grade of 0.8 per cent at a speed of 53 miles an hour.

The weight of freight trains has increased in the same proportion and their accelerations have been none the less remarkable. There are locomotives in use on some of the French lines that are capable of hauling a load of 250 tons on a grade of 2.5 per cent. at a speed of 15.5 miles an hour and from 600 to 800 tons up a grade of 1 per cent. One of the recent Northern Railroad locomotives of the Mallet type has hauled 1,000 tons up an adverse grade of 1 per cent. at a speed of 12 miles an hour.

The mixed six-coupled locomotive with driving wheels 69 in. to 71 in. in diameter and with a bogie in front has been extensively adopted, during the past few years. This type has an average adhesive weight of 50 tons, perfect stability at the highest speeds and high evaporative efficiency can be adapted to the most varied classes of service from the heaviest freight trains to passen-

ger trains, and, in case of necessity, even to high-speed express service.

The general increase in the power of locomotives in France is shown in the following table, which relates, however, only to high speed locomotives:

	Types in service or under construction							
	1896				1906			
	Type.	Grate area, sq.ft.	Heating surface, sq.ft.	Weight, in tons, On Total.	Type.	Grate area, sq.ft.	Heating surface, sq.ft.	Weight, in tons, On Total.
Ouest ...	4-4-0	21.52	1,327.59	45.50 28.50	4-6-0	26.36	2,162.22	65.30 46.00
Nord ...	4-4-0	21.95	1,670.78	47.80 30.50	4-4-2	29.48	2,323.81	66.50 33.00
Est.	4-4-0	26.04	1,807.41	56.80 33.40	4-6-0	34.00	2,528.22	74.35 51.90
Paris, Lyons & Med.	4-4-0	24.42	1,589.02	50.60 31.90	4-6-0	31.52	2,379.76	70.70 50.55
Paris-Orleans ...		4-4-2	18.72	1,494.34	48.30 28.80	4-4-2	33.35	2,575.56	72.90 35.60

The actual increase in power of recent locomotives is really greater than would arise from the mere increase in size of the several parts themselves. It is necessary to consider, in this connection, the different improvements which have served to increase the efficiency. Among these may be mentioned a better arrangement of the fireboxes, distribution of the stresses through four cranks and the general proportions adopted which have made it possible for the new locomotives to maintain a development of power nearer the limit of their capacity for a long time and with less strain on their several parts. The locomotives now in use in

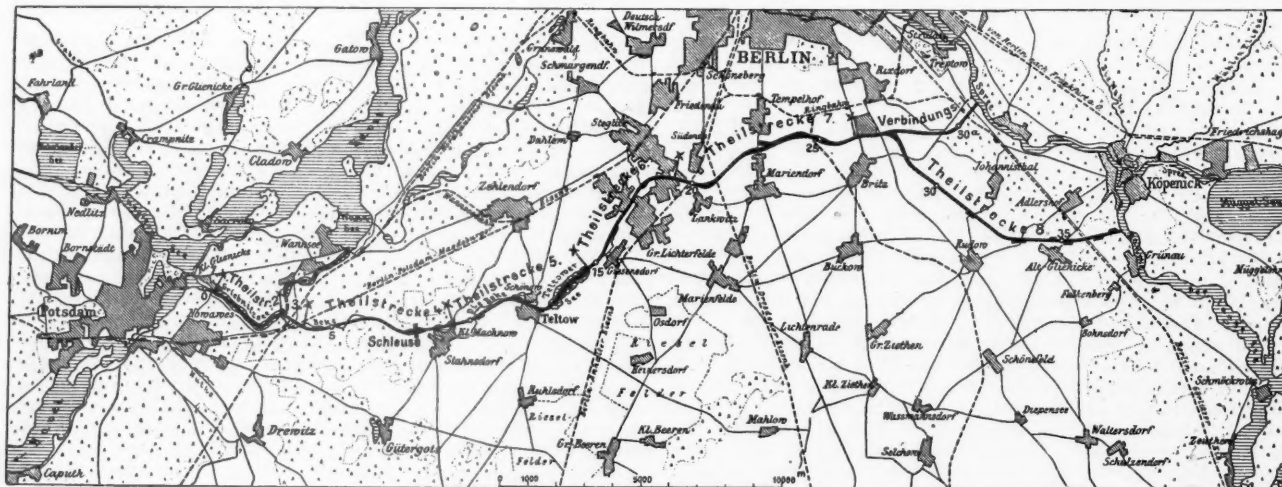
extended smokebox and stack slightly truncated; an inclined grate provided with a drop; a dome for the throttle set either at the center or somewhat to the front of the shell, containing a gridiron throttle, operated by an outside or inside bell crank, but with steam pipes almost always on the outside; the use of the bogie on most of the high-speed locomotives and on many freight locomotives; inside frames except with articulated trucks where they are frequently outside; the general or partial use of equalizing levers; the general use of the four-cylinder compound system with two outside cylinders driving the second coupled axle and two inside cylinders driving the forward coupled axle; independent valve gear of the Walschaert type; increasing use of piston valves; grate area varying from 35 to 38 sq. ft. and heating surface from 2,100 to 2,500 sq. ft.

(To be continued.)

The Teltow Canal.

BY REGINALD GORDON.

A publication recently issued by the Siemens-Schuckert electrical works of Berlin, Germany, gives a detailed description of the Teltow canal, lately completed, a waterway about 23 miles long, extending between the rivers Havel and Spree, just south of Berlin. It shortens the distance between these two rivers, and avoids a



Map of the Teltow Canal.

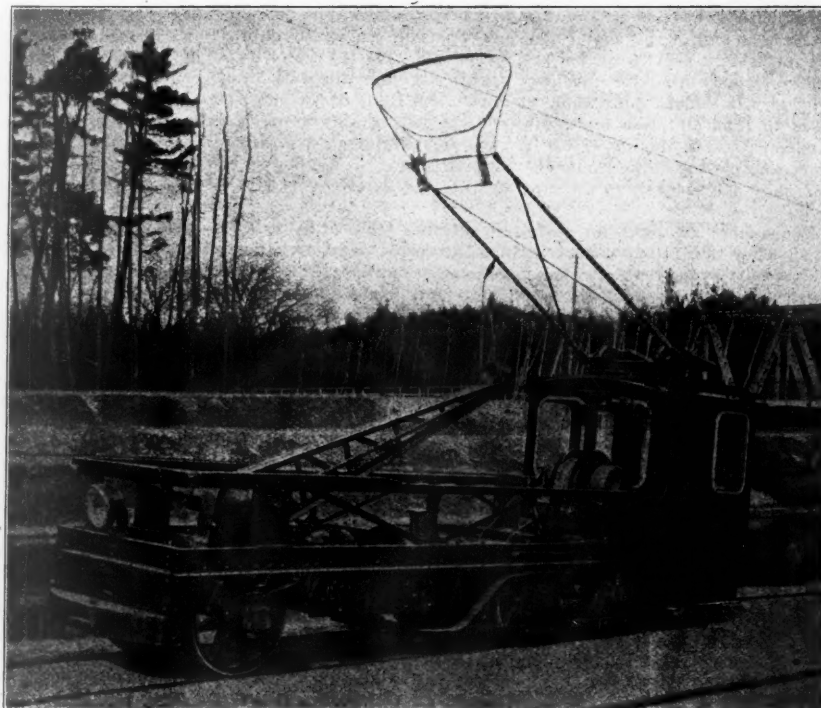
France develop from 50 to 60 indicated horsepower per sq. ft. of grate area.

The four-cylinder system of compounding, although it takes second place as compared with the increase of grate area, heating surface and weight, is none the less an important improvement. In France the four-cylinder compound was created and first developed and its advantages are now beginning to be appreciated even in those countries where the compound locomotive is looked upon with less favor. It is difficult to estimate the part played by this design, for it has only been applied to new locomotives that are a great improvement over the old in every point, and especially in the matter of the increase of power; but there is no doubt but that it has contributed essentially to the success of recent types of French locomotives.

The standardization of motive power is the result of different causes, but is especially due to the development of power. The nearer we approach the limit of weight and clearance the fewer will be the available number of solutions of the many problems and the better the type will be defined.

Independently of the general types, France is the country where locomotives of recent construction possess the greatest number of common characteristics as far as general arrangement and details are concerned. These characteristics may be summed up as follows:

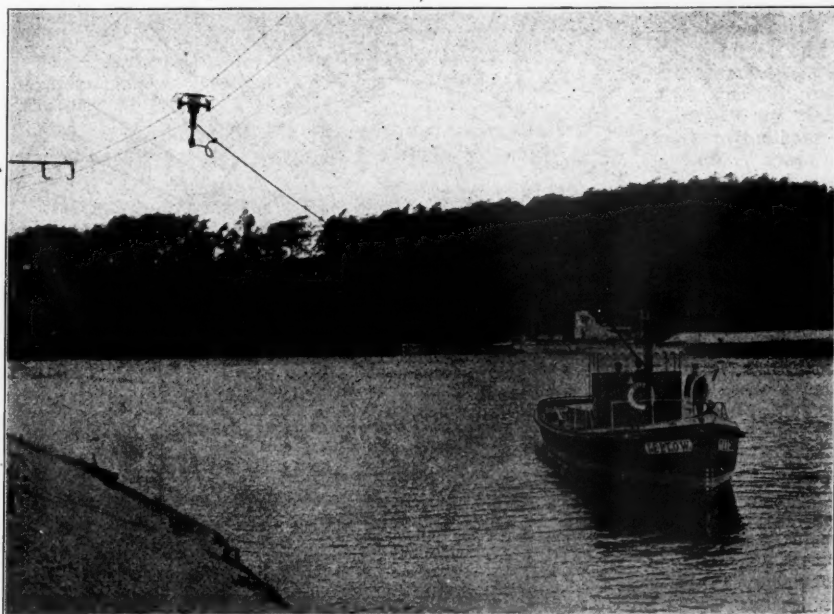
A boiler with a Belpaire firebox dropped down between the frames; Serve tubes; a boiler pressure of from 180 to 195 lbs.; an



Electric Mule, Teltow Canal.

haul through the city itself. At the west end it begins at Klein Glienicke, on the Havel, and extends easterly to Grunau and Köpenick on the Spree, passing through Alt Glienicke, Mariendorf, Gross Lichterfelde, Teltow and Stahnsdorf. Three lines of railroad had to be crossed, and a lock built at Mächnow, but otherwise the construction of the canal offered no great engineering difficulties. It is worthy of note, however, that electric towing locomotives are used, and appear to give entire satisfaction.

The cross section of the canal is designed for a waterway having a minimum depth of 8 ft. at the center, 65 ft. wide on the bottom, and the banks under water sloped 1:3. The barges used are 213 ft. long, 28 ft. beam, and draw 5 ft. of water, loaded. On those portions of the canal where the towing locomotives are employed, a track one meter gage (39.37 in.) is laid on the towpath, and a trolley wire is suspended 15 ft. 5 in. above it from brackets fastened to latticed steel poles set in concrete. The towing locomotive is mounted on six wheels, a single axle supporting one end of the frame on which the towing mast and its operating motor are mounted, while a four-wheel truck supports the other end. Each axle of this truck is driven by an 8 h.p. series wound, 550 volt, direct-current motor through double reduction gears. Current is collected from the trolley wire by a bow trolley of the type commonly used in Europe. In addition to the driving motors, a 3 h.p. motor raises and lowers the towing pole, besides which a 3 h.p. motor is installed on the locomotive for turning the rope winch. This winch is equipped with a clutch so arranged that in starting a boat from rest, if the tension on the towing rope exceeds 16,500



Towboat, Teltow Canal.

lbs., the rope is released and can run out a little until the extra strain is reduced, when the clutch again takes hold and the tractive force is applied once more. In those parts of the canal that are lakes, and where it was not practicable to employ locomotives on the towpath, towboats are used. One of these is an ordinary steam tug, but on one of the lakes an electric towing vessel is at present on trial. The boat has three screws, each one driven by an electric motor supplied with current by a trolley running on a wire suspended over the water parallel to and near the bank of the lake. Whether this will prove satisfactory remains to be shown by actual service.

The Russian authorities seriously contemplate building a railroad from the present eastern terminus of the Siberian Railroad at Srjetensk down the Amoor to Chabarovsk, the northern terminus of the Ussuri Railroad to Vladivostok, which was the route originally planned for the Siberian Railroad, and which was abandoned when the much more direct route of the Chinese Eastern Railroad was secured. This part of the Chinese Eastern is north of the line controlled by Japan, and economically should give much the best route to Vladivostok. There is now steamboat navigation all the way from Srjetensk to Chabarovsk; but only vessels of very light draft can navigate the upper channel. The government contemplates building on its own account 240 miles over a very difficult country to the point where the union of the Schilka and Argun rivers forms the Amoor. Thence for about 800 miles it is thought that a company may undertake the work.

Waterproofing Masonry and Concrete Structures.*

Two general methods have been tried for making concrete and masonry structures impervious to water—(1) treating the concrete with some foreign constituent, soda, alum, lye, etc., to make the mass impermeable and washing the surfaces with a cement paint or plaster, and (2) covering the masonry with a skin of some watertight material, pitch, felt, tar paper, etc. The first method may suffice for masonry which is sound and stable under all conditions, but it is absolutely useless if cracks develop due to contraction or settling. In ordinary concrete if a crack develops on the surface exposed to water moisture will be drawn up into the mass 15 ft. or 20 ft. and water will percolate through 20 ft. of concrete. It may take two or three years to do it, but water will come through it in time. When the concrete thus becomes damp, wet and saturated with moisture, it is impossible to get the moisture out. If the moisture freezes—expanding ten times its volume in so doing—the effect upon the concrete or masonry is disastrous.

The only correct way to make masonry waterproof is to provide a flexible, impervious, outer skin and prevent moisture from reaching the masonry even on the surface. The first efforts in this direction were to coat the surface to be waterproofed with hot coal-tar, pitch or asphalt, which, however, when set and cold, cracked and separated with any settling or cracking of the masonry. Burlap was subsequently used to reinforce the pitch or asphalt, without, however, preventing them from cracking, and the burlap, itself not being waterproof, did not give waterproofness. Later on, there came

into use for this purpose tar paper, which, however, lacks pliability and tensile strength. Tar and tar paper have been extensively used for waterproofing in the past, simply because there was nothing else open to the profession. It was not until recent years that any serious effort was made to place waterproofing on a scientific basis, and to make materials specially adapted to the various conditions—materials which would not become brittle or be injuriously acted upon by water, the salts in the earth, alkali in cement, etc.

The best material is a strong, fibrous felt, made in one sheet, absolutely impervious to water by a process of saturation and coating with materials specially adapted to withstand the injurious action of water, and particularly all underground conditions. It is then practically an impervious membrane or skin through which, of course, in one sheet, water will not pass. As many layers thereof, as the conditions require, can be then cemented or veneered together with a waterproof bitumen-cement, not too weak, or hard and brittle, for the felt, but as strong and elastic as the felt. This forms a waterproof stratum so strong, tough and pliable, that, without injury, it can be readily pulled, bent, turned, twisted, etc. Whether in a building foundation, covering the floor of a bridge, or enveloping a tunnel, it readily conforms to the final conformation of the surface waterproofed, from which it is practically apart, and which it insulates

and protects under all conditions—settlement, jars, shocks, cracks, expansion, contraction, heat, snow, ice, water, etc.

No waterproofing, especially for difficult and waterpressure work, should be undertaken when the temperature is below 25 deg. F. Fifty per cent. better work can be done when the weather is warm. In cold weather the felt sheets are difficult to handle, the hot bitumen-cement chills and congeals too quickly, especially when it comes in contact with a cold wall, and it is difficult to obtain the perfect cohesion of the different felt layers. Allow sufficient time, room and accommodations in which to properly apply the materials.

Thoroughly protect the waterproofing during and after application. The average laborer is no respecter of waterproofing, especially an elastic waterproofing, and will walk on some, roll wheelbarrows over it, throw tools, lumber, brick, stones, cement and debris thereon to its serious damage. After arches are waterproofed it is a common mistake in placing the fill to not begin same at the base of the arch but to dump the fill on the crown. The fill thus often breaks through the brick or cement protection on the waterproofing, and tears or strips the waterproofing from the arch surface. It is false economy to not always permanently protect waterproofing with a layer of brick or cement mortar.

The best method of applying the felt, especially on flat surfaces, is to roll the felt after the mop spreads on the hot cement. Rolling presses out air bubbles and insures better sticking. A workman follows, rubbing and pressing the felt over the entire surface to insure

*Extract from a paper by Edward W. DeKnight, Manager, Hydrex Felt & Engineering Co., before the Western Society of Engineers, Nov. 21, 1906.

thorough adhesion to the under layer. The usual method of doing such work with the old-school materials is to first lay out, shingle fashion, all the felt, then turn back one sheet at a time, rapidly run a mop full of pitch over the edge of the under sheet, let the lifted sheet fall in place, and walk on it. This is quick and cheap work for the contractor, usually a roofer—but it is not waterproofing.

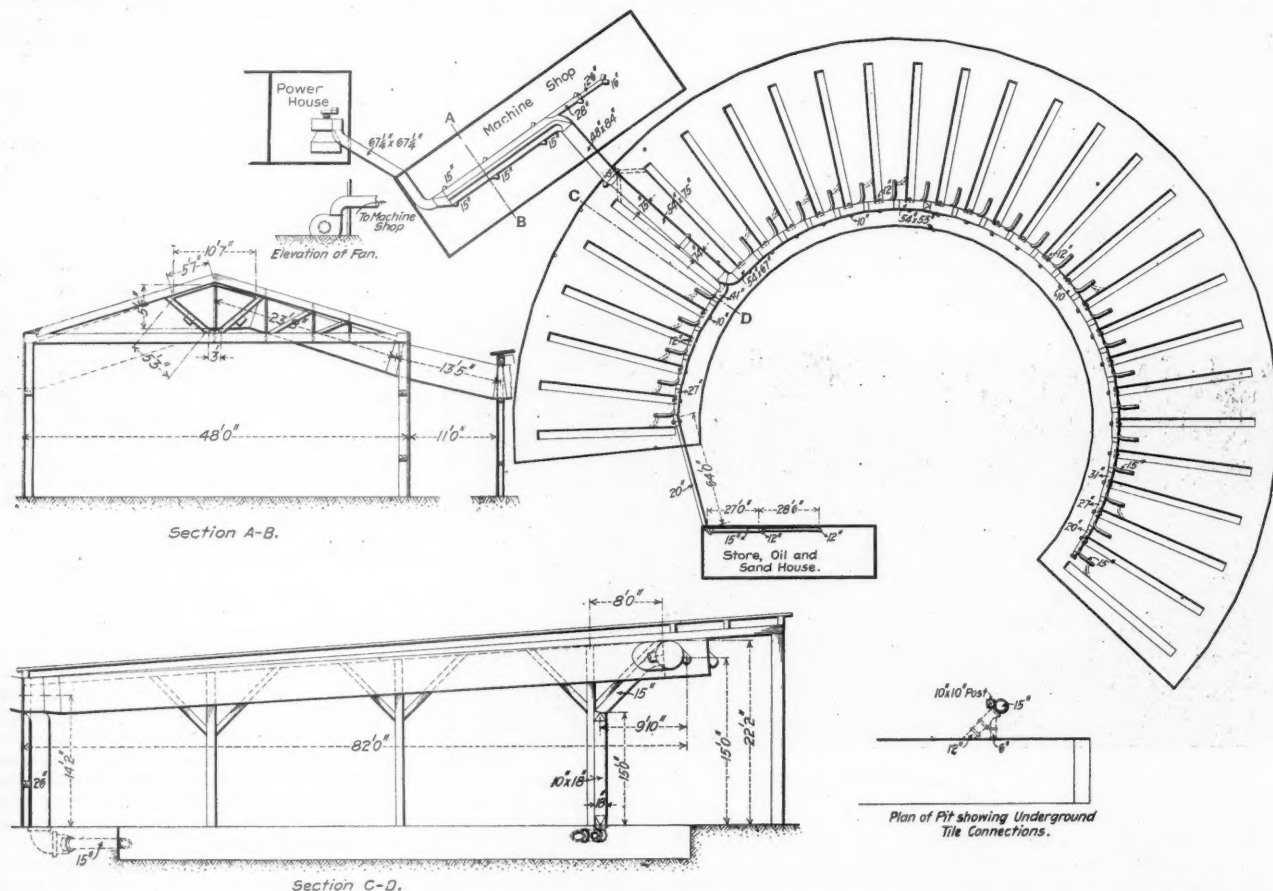
Induced Draft and Heating Equipment of the Erie Railroad Roundhouse at Susquehanna, Pa.

The Erie Railroad has recently completed a new 29-stall frame roundhouse, machine shop and power house at Susquehanna, Pa., in which the principal features of interest are the heating and ventilating arrangements and the installation of induced draft apparatus for the boilers. The buildings are all of the standard type adopted by the Erie for intermediate engine terminals, of which an illustrated description was published in the *Railroad Gazette* June 15, 1906. The arrangement of the buildings at Susquehanna, shown in the accompanying illustration, is different from the terminal at Hammond previously described. As will be seen, the machine shop

The blast for the heating system is supplied by a 210-in. three-quarter housing, up-blast type fan running at 160 r.p.m. The lower quarter of the housing is formed in the foundation, which also supports a 9-in. x 14-in. horizontal side crank engine, direct connected to the fan wheel shaft. The blast wheel is 127 in. in diameter and 51 in wide at the periphery, with wings or fan blades carried on a double spider. The fan draws in air over a heater bank of 24 sections of two rows of 1-in. pipe. Each section is 7 ft. x 8 ft. 4 in. and contains 480 lineal feet, or a total of 11,520 lineal feet. Separate steam supply and drip connections are provided for each section, giving perfect control over the temperature of the blast. The heater bank is enclosed in a sheet steel casing which forms the intake duct to the fan.

The buildings to be ventilated contain 1,430,000 cu. ft., and to insure proper ventilation 78,000 cu. ft. of air per minute was provided for, giving a complete change of air about every 20 minutes. The air leaves the fan at a velocity of 2,230 ft. per minute. In zero weather the heater bank can be made to heat the intake air to 130 deg. Fahr., which will maintain a temperature of from 60 to 65 degs. in the buildings.

The distributing system of ducts required over 20 tons of



Heating and Ventilating System for the Erie Railroad Roundhouse at Susquehanna, Pa.

is between the power house and the roundhouse, and one of the difficulties met with in designing the heating system was to pass the main air duct through machine shop without encroaching on the limited head room of 19 ft. This was done by making the duct of the same cross-section—diamond shaped—as the middle panels of the roof trusses.

The power house at Susquehanna contains two 400-h.p. Babcock & Wilcox boilers in one room, and pumps, air compressors and ventilating fan, heater coils, etc., in the adjoining room. Draft for the boilers is created by a 120-in. induced draft fan mounted on a steel framework about 21 ft. above the floor and exhausting into a 52-in. steel stack 20 ft. high extending up through the roof. The fan is of the full housing type, with a blast wheel 85 in. in diameter and 33½ in. wide at the periphery. It is driven by a direct-connected 7-in. x 7-in. Buffalo vertical engine. The speed is controlled by a throttle governor operated by the steam pressure carried by the boilers and adjusted to maintain any desired draft and steam pressure. The fan bearings next to the fan are water-cooled to prevent overheating by contact with the hot gases passing through. A fan of this size will handle 33,300 cu. ft. of gas per minute under a pressure of 1 ounce at 230 r.p.m. and requires about 14 h.p.

galvanized iron besides the tile ducts in the engine pits. The main duct from the fan, 67½ in. x 67½ in., enters the machine shop under the eaves at one end and is carried up under the roof to the ridge, where it changes to the diamond-shaped duct in the roof trusses. A little beyond the center of the building it is turned to one side and run out again under the eaves across to the roundhouse. An extension 28 in. in diameter carries warm air to the far end of shop.

In the roundhouse the main duct runs through to the inner circle under the roof and then branches to each side, continuing on around to the end pits. In addition to the 10-in. and 12-in. outlets from the main duct under the roof, a 15-in. pipe is carried down the post between each pit and connects at the bottom to two tile ducts leading into the engine pits. Warm air is thus introduced and evenly distributed under an engine standing over the pit and quickly thaws out ice and snow. In connection with the large smoke jacks employed (see *Railroad Gazette*, June 15, 1906), this system of ventilation keeps the house free from smoke and always supplied with fresh clean air.

The entire equipment for induced draft and heating and ventilating was designed, built and installed by the Buffalo Forge Co.

GENERAL NEWS SECTION

NOTES.

The coal pier at Baltimore of the Northern Central was burned on January 22.

According to press despatches the cotton congestion at Galveston has now been removed.

It is understood that there is to be a general reorganization of all the fast freight lines on the Vanderbilt roads.

The railroads of Illinois are reported to be granting passes good only within the state to members of the state legislature.

The Georgia Car Works, three miles from Savannah, Ga., were destroyed by fire January 17, with a loss estimated at \$300,000.

The Great Northern is said to be bringing negroes from Missouri for work on its lines in Washington to take the place of Japanese labor.

It is reported that the Wabash has agreed to exchange transportation good only within the state of Missouri for newspaper advertising.

It is reported that the Burlington will make a traffic arrangement with the Kansas City, Mexico & Orient for carrying Mexican traffic.

The Hudson Navigation Company, one of the Morse steamship companies, has increased its capital stock from \$4,000,000 to \$8,000,000.

A car of powder on the Big Four exploded while standing on a siding at Sandford, Ind., January 19, wrecking a westbound passenger train.

Great Northern train No. 4, from Seattle, arrived in St. Paul on January 17, 10 days late, after having been snowbound in Montana and North Dakota.

The Pennsylvania has finished a stone and steel bridge nearly a mile long across the Susquehanna river between Havre de Grace, Pa., and Perryville.

The Chicago, Indianapolis & Louisville (Monon) has receded from its position that it will issue interstate transportation in exchange for newspaper advertising.

The Atlantic Coast Line announces a general increase in the salaries of clerks, agents, trainmasters, dispatchers and section masters that will cost the road about \$250,000 a year.

To provide against the congested hotels of New Orleans during the Mardi Gras, the Illinois Central will run a special train in which the passengers will eat and sleep while in the city.

The Omaha Post Office has been informed by the Government that on and after January 24 the Chicago, Rock Island & Pacific will carry the fast mail between Chicago and Omaha. For 20 years the Burlington has held this contract.

The Atlantic County, N. J., grand jury, which completed its sittings on January 17, found no indictments in regard to the Meadow Thoroughfare wreck near Atlantic City last October, but censured the railroad company for faulty construction of the bridge.

Switchmen of the Chicago & North-Western, at Janesville, Wis., an important division point, have had their workday cut from 11 to 10 hours. While the pay is lessened, the switchmen receive a little more money, comparatively, than they did under the 11-hour day.

Announcement is made that the railroads of Ohio have decided to restore the party rates which were declared off when the 2-cent law went into effect. This is construed to mean that hereafter special rates will be granted to conventions within the state as well as outside.

The New York, Chicago & St. Louis is reported to have withdrawn from the Cleveland Car Association on the ground that the association has served its purpose, which was to insure fair treatment of shippers, and that this is now gained under the operation of the rate law.

The Santa Fe has been indicted at Los Angeles for granting rebates and concessions on freight shipments in 76 cases, to John L. Shirm and the Grand Canon Lime & Cement Co., in the shipment of lime from Nelson, Ariz., to southern California points. The cement company has also been indicted for accepting them.

In February the Toledo, St. Louis & Western (Clover Leaf) will

withdraw its reduced grain rates from St. Louis to Toledo, which restores the old rate adjustment between St. Louis and Chicago. The proposed proceeding against the road before the Interstate Commerce Commission by the grain interests of Chicago will in consequence be dropped.

William A. Martin, of the Pittsburg City Council, has been convicted of soliciting a bribe from President C. S. Cameron of the Pittsburg & Tube City Railroad Company in order to secure the passage of an ordinance in City Councils giving the railroad company the right to extend its tracks into the city. Cameron, the briber, has also been convicted of larceny and contempt of court.

The New York, New Haven & Hartford has issued an order to yardmasters, engineers, yard foremen, shop foremen and others, to the effect that employees having supervision over other employees will be held strictly accountable if they do not protect such employees from injuries due to the negligence of those in control. Foremen must take every precaution against any carelessness or negligence on their part which may result in injuries to those under them.

Elevated Railroad to be Built in Brazil.

A 70-year franchise has been granted to Carlos Schmidt and others of Rio de Janeiro for construction of an elevated railroad to serve the city of Rio de Janeiro and its suburbs. This franchise was obtained for an American company. It represents a purely American enterprise, and present plans are that all the equipment will be purchased in the United States. Charles E. Browne, of New York City, is president of the company. It is planned to send engineers and technical experts to Rio de Janeiro in January to begin preliminary work. Within four years 1 1/2 miles must be in operation. Plans call for about 60 miles of right of way, which is to be double tracked throughout. The third rail electric system will be used, motive power to be derived from its own plant or from one of the two great concerns now preparing to develop water power in the mountains near Rio de Janeiro. For its privileges the company holding the concession must pay the municipality \$16,666 for the first year, \$20,000 per annum for the next 30 years, and \$23,333 per annum for the following 30 years.—Consular Reports.

Annual Dinner of the Transportation Club of New York.

The Eleventh Annual Dinner of the Transportation Club of New York was held at the club rooms in the Hotel Manhattan on Tuesday evening, January 22. Senator Chauncey M. Depew presided and spoke at some length of the development of railroad interests during the 40 years in which he had been connected with the railroad business. He recalled that when he entered the railroad service the three railroad magnates of the day, and the only three, were Commodore Vanderbilt, Thomas A. Scott and John W. Garrett. At that time there were 30,000 miles of railroad, mostly single track, in the country. W. H. Boardman, Editor of the *Railroad Gazette*, reviewed the progress made during the 10 years' life of the club in various branches of the railroad world. Logan G. McPherson, lecturer on transportation at Johns Hopkins University and author of "The Working of the Railroads," referred to the hostility to the railroads to-day as partly a survival of the bitterness with which those whose business was hurt by the building of railroads regarded the new transportation in the early days. He urged that the public should be educated to understand the grave problems which railroad managements have constantly to face. Julius M. Mayer, who retired on January 1 as Attorney General of New York State, argued that the man in the street should not be left in the dark as to the reasons for vexations which he might suffer in railroad service, but that railroad officials should make it a point to make the public understand the reasons for such happenings, in which case he believed that they could be depended on to be reasonable in their demands. He also urged that an "automatic and mathematic" system of uniform taxation for railroads should be adopted. The last speaker of the evening was George H. Daniels, the veteran of the New York Central service. His subject was the humorous side of railroading, which he succeeded admirably in bringing out. He contended that the railroad business was the most honestly managed business in the world and in proof of this statement called attention to the fact that if he went into a drug store and asked for a special preparation the clerk was almost sure to offer him several things "just as good," but he defied anyone to mention a case where a man had gone to the ticket window of a railroad and asked for a ticket to Buffalo and the ticket agent had tried to persuade him that what he wanted was a ticket to Montreal. He also dwelt upon the Erie canal as adding to the gaiety of nations.

The Transportation Club, of which Chauncey M. Depew is Pres-

dent and John Carstensen, Vice-President of the New York Central, is Vice-President, has a membership of between 400 and 500 resident and the same number of non-resident members.

New Mileage in New York State.

The New York State Railroad Commissioner's report for the year ended June 30, 1906, shows the increases and decreases in the steam railroad mileage in New York state during the year as follows:

Increases.	
Delaware & Eastern	13.67
Glenfield & Western	3.60
Long Island: Brooklyn & Jamaica .....	.08
Lowville & Beaver River	10.44
New York & Ottawa .....	.87
Fitts, Shawmut & Nor.; Roch., Hornellsvl. & Lack. ....	.09
Port Chester Terminal .....	.41
Decreases.	
Buffalo & Susquehanna: Addison & Susquehanna ....	.27
Erie	2.35
Lehigh Valley .....	.51
New York Central & Hudson River	1.94
Spuyten Duyvil & Port Morris .....	.73
New York, Ontario & Western:	
Port Jervis, Monticello & Summitville	2.53
Pittsburg, Shawmut & Northern .....	.67
Net increase	20.16

In addition the following has been constructed since June 30 and up to January 1, 1907:

Delaware & Eastern, 23.85 miles in addition to amount shown above, which addition was opened November 17, 1906.

Buffalo, Thousand Islands & Portland, less than one mile. This has been constructed for some time previous to this year.

Buffalo & Susquehanna, 87.45 miles.

Carthage & Copenhagen, 8.75 miles.

Erie & Jersey, grading, 37½ per cent.; masonry, 45 per cent.; tunnels, 47 per cent. No track has been laid.

New York, Auburn & Lansing, 19.50 miles. Has been operated partially for freight purposes, the construction trains carrying freight for the accommodation of the shippers along the road.

Tunnesassa & Bradford, five miles, opened September 1, 1906.

Adirondack & St. Lawrence, 3.61 miles. This road was formally opened on January 1, 1907.

Eleventh Avenue Committee.

Alexander E. Orr, President of the New York Rapid Transit Commission, has appointed Morris K. Jesup, Mayor McClellan and Charles Stewart Smith a special committee of the Commission to consider the request of William H. Newman, president of the New York Central, that the company be allowed to build an elevated freight structure in the marginal street along the North River, instead of being compelled to put its Eleventh avenue tracks into a subway, as required by the Saxe law. At a meeting next week Mr. Newman's request will be considered by the committee.

J. J. Hill on Car Movement.

The following is from a speech of the President of the Great Northern before the National Lumbermen's Association:

I want to say to you in all candor that I am totally unable to see how business can be handled and how there will be a full supply of cars and facilities to handle it as it should be handled, possibly within 10 years. The problem is so large that people do not realize what it means. The figures from the reports of the Interstate Commerce Commission show that the increase of business in the United States from 1895 to 1905 was 118 per cent., or nearly 12 per cent. a year. The increased railroad mileage during that time was 2 per cent. a year; the increase of locomotives about 35 or 37 per cent., and in freight cars about 45 per cent. But the increase in tons hauled by each locomotive was 58 per cent. And notwithstanding all that, the country stands to-day in front of a condition that is practically slow paralysis. During the last twelve months the great Northern railroad added 100 locomotives and over 6,000 freight cars. This year we have ordered 150 locomotives and between 6,500 and 7,000 freight cars. In two years that would be of cars and engines about 115 miles, and still we have not been able to move the business. I will tell you why. Seven or eight years ago we used to get 45 to 48 miles a day out of a freight car. We are now getting on the Great Northern about 28, and I dare say now, during the period of storms, we are not getting 15. But when there is a fair opportunity to move, as in the month of October, we are getting 28 miles a day. The average of the United States is less than 25 miles a day, and you know how freight trains move. You know they move from 12 to 15 miles an hour. That means a car is moving one-twelfth of the time and standing still eleven-twelfths. The reason for that is a want of trackage, largely terminals, but a want of trackage; the business has outgrown the facilities.

I want to ask your most earnest attention and to urge on you that there will be no relief for the movement of lumber without delay from the Pacific coast, with the long distance it has to travel, until there can be more tracks on which to move cars. There

are cars enough to-day if they could move. In place of 24, if they could move 50 miles a day where they now move four hours out of the 24, or one-sixth of the time, there would be cars enough to-day to move a great deal more lumber than you want to buy. But without tracks and terminal facilities they cannot be moved and it will not be moved, and the great famine will continue until these facilities and appliances are furnished.

New York Railroad Club to Move.

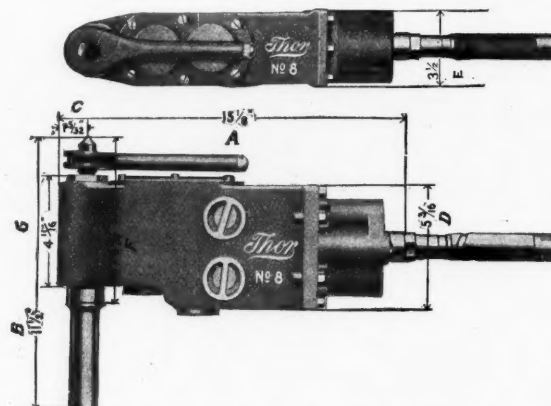
At the January meeting of the New York Railroad Club held last Friday evening at Carnegie Hall, the President of the club announced the successful conclusion of negotiations for the use of the Engineering Societies, 29 West Thirty-ninth street, for the regular monthly meetings, the change to be effective with the next meeting, February 15. The members expressed approval of the action of the officers by a unanimous vote of thanks for their promptness in taking advantage of the opportunity to secure the new quarters, in every way so much better suited to the club's present requirements.

New Offices for Morse Steamship Company.

The passenger departments of the Morse steamship lines, including the Clyde Steamship Company, Mallory Steamship Company, Metropolitan Steamship Company, Eastern Steamship Company, People's Line and Citizens' Line, now have offices together at 290 Broadway, corner of Reade street.

A New Close-Quarter Air Drill.

The Independent Pneumatic Tool Co., Chicago, has placed on the market a new air drill styled "Thor" No. 8 close-quarter piston air drill, which is illustrated herewith. It is intended for drilling in close quarters and corners where an ordinary drill cannot be used. Many points of superiority are claimed for the device. It is capable of drilling up 2½ in. in diameter in any kind of metal, has no delicate mechanism and is easily handled and operated. Its



"Thor" No. 8. Close-Quarter Piston Air Drill.

dimensions are: Distance from throttle connection to outside of spindle case, 15½ in.; distance from point of feed screw to end of socket, 11½ in.; radius from center of feed screw to outside of case, 1½ in.; width of case at cylinder flanges, 5⅞ in.; thickness of outside of cases, 3½ in.; distance from point of feed screw to end of spindle, 6¾ in.; width of case at spindle, 4⅞ in. The company will send the drill on approval to anyone wishing to make a test of it.

Output of Baldwin Locomotive Works.

The number of locomotives manufactured by the Baldwin Locomotive Works during the calendar year 1906 was larger by about 18 per cent. than in 1905. Of the total of 2,652, 201 were electric and 2,451 steam locomotives. The annual output of both steam and electric locomotives during recent years is as follows:

	1906.	1905.	1904.	1903.	1902.	1901.
No. of locomotives	2,652	2,250	1,485	2,022	1,533	1,375

First Rate Under New Law.

The Interstate Commerce Commission has just promulgated its first decision under the new Rate law, in which use is made of its rate-making power. The decision is that a rate of \$2.75 per ton is a fair figure for carrying bricks from Frederick, Md., to Elberon, N. J. Prior to December of last year, the regular rate for such shipment was the sixth-class rate of \$3.80 per ton. The sixth class applies to all traffic of rough character, such as stone, cement, lime, lumber, etc., and the \$3.80 rate has applied to such shipments from Frederick, Md., ever since the official classification was established.

The Frederick Brick Company, desiring to make certain shipments over the Pennsylvania Railroad, asked for a special commodity rate. The Pennsylvania, which has not heretofore enjoyed the patronage of the Frederick Brick Company, that concern being

local to the Baltimore & Ohio, set about making the rate in the ordinary way and quoted, subject to acceptance in time for publication upon statutory notice, a rate of \$3.10 from Frederick to Elberon. The rate was not accepted, and a shipment being made, the company charged at the old rate of \$3.80 per ton. Against this the brick company protested, contending that a rate of \$1.85 be established as a fair one for such shipments. Meanwhile the Pennsylvania, in its regular process of developing traffic, again took up the matter and fixed upon \$2.75 as a rate between those points, which could be made without serious disturbance to other rates, and published that as its regular rate.

The complaint of the brick company coming before the Interstate Commerce Commission, the railroad company expressed its willingness to refund to the brick company the difference between the \$3.80 and the \$2.75 rate, providing the approval of the Commission could be secured. The Commission, after a full hearing, indorsed the rate which the railroad had made in the regular course of business and ruled that the \$1.85 rate contended for by the brick company would be an unreasonably low one, and ordered that shipments made under the \$3.80 rate prior to the issuing and filing of the \$2.75 rate should be corrected on that basis and the necessary refund made to the Frederick Brick Company.

New Hamburg Liner.

It is said that the Hamburg-American Steamship Company has ordered of Harland & Wolff, of Belfast, Ireland, a steamer, to exceed in size the "Amerika" and the "Kaiserin Auguste Victoria." The new boat is to carry 4,250 passengers in addition to a crew of 500, and to make 19 knots an hour.

New Erie Ferry Boats.

The Erie has ordered a new double-decked ferryboat, a duplicate of the "Goshen," for the service between Manhattan and Jersey City. The new boat, having a steel hull, will be 224 feet long, and will be the fifth new double-decked vessel, the others being the "Goshen," "Tuxedo," "Arlington" and "Chautauqua."

Grade Crossing Removal Annulled.

The New York Railroad Commissioners announced January 21 that they had annulled their determinations of May 24, 1899, and July 11, 1900, to eliminate grade crossings of the Long Island Railroad at Smith Road, in the town of Hempstead; Lake View avenue, in the town of Jamaica, and Lawrence street, in the town of Flushing. These annulments are made, the Board explains, because of the failure of the local authorities to secure the necessary land, and the board feels that the state money appropriated for the abolition of these crossings "should be expended in other communities that want the benefits which the grade crossing law contemplates."

The Price of Cars.

The following testimony was brought out at a car shortage hearing at Seattle, January 22.

Charles E. Patton, president of the Reliance Lumber Company, gave some figures showing apparent discrimination in the distribution of cars among the mills.

"How do you account for this discrimination?" asked Commissioner Lane.

"Only that somebody was buying cars," replied the witness.

"What is the common salutation among lumbermen?" asked Austin E. Griffith, who was conducting the examination for the lumbermen.

"What is the price of cars to-day?" said Mr. Patton. "The price of cars runs from \$1 to \$5 a car, paid to railroad employees."

"How common is that salutation among the lumbermen?" queried Commissioner Lane.

"Oh, very common," replied the witness. "It is almost a joke. Some weeks ago the superintendent of our mill saw a very large car being switched about and asked if we were going to get that car. The conductor asked him how much it was worth to him. I have given strict orders that we are not to buy any cars, and the superintendent said that while we wanted the car pretty badly we were not going to pay for it. The conductor said that it was worth \$10 to him and we did not get that car."

Philadelphia's Traction Troubles.

Philadelphia, like every other big city, has its traction problem. There is no cry in Philadelphia for municipal ownership, no agitation for lower fares. There has been no determined fight against the traction company such as has been carried on in Chicago and Cleveland, where new franchises were persistently refused to the street railway companies. The Philadelphia Rapid Transit Company has received all of the franchises it wants and received them free, even in these days when there is elsewhere general opposition to such municipal generosity. It is crying out to be saved from the results of its own methods. It needs succor. George H. Earle, Jr., of the Board of Directors of the Rapid Transit Company, says that to bring the system up to the city's needs \$10,000,000, perhaps even \$20,000,000, must be spent each year. He advocates a plan by

which the city should lend its credit to the transit company, being represented on its Board of Directors and sharing in its profits. In this way it is thought the company might be enabled to carry out the needed improvements which it has undertaken. The Rapid Transit Company has so exhausted its credit that it is unable to make the extensions of its system which the city needs. If it surrenders or is deprived of the valuable franchises which it has failed to carry out, it opens the field to a rival. George W. Norris, a banker of Philadelphia, has presented figures to show that there is \$76,750,000 of water in a total capitalization of \$165,000,000. The result is that, owing to the terms of the leases of underlying companies, the Rapid Transit Company has to pay 5 per cent. interest on about twice the capital put into its plant, without allowance for depreciation. The amount of "water" in the stock of the company has made it an uninviting business proposition to private capital. Meanwhile the public is becoming more impatient and more insistent that something be done.—*New York Tribune*.

Passenger Traffic Between New York and Chicago.

W. J. Lynch, Passenger Traffic Manager of the New York Central Lines, is quoted in the *Wall Street Journal* as follows:

"Travel in our territory averages 8 per cent. heavier than that of a year ago. It is the heaviest on record. The increase is about equally divided between local and through travel and is spread proportionately in all directions. The increase in travel offsets about 50 per cent. of the decline in rates last year, caused principally by the two cent fare law in Ohio. What the effect of the decline in rates is depends on the density of population. In thickly settled communities we have gained some travel at the expense of the trolley lines. That travel, however, belonged to us originally. Little new travel has been created by the reduction in fares. Nor has the abolition of passes helped much since the new rate law took effect. Our attention is directed mostly to the two cent fare legislation proposed in Illinois and Indiana. Even if both measures are passed, on top of the Ohio law, the through rates between Chicago and New York would not be affected. The average rate between Chicago and New York is only 2.19 cents per mile. This is figured on the basis of \$20 applied to the short route via the Pennsylvania. The \$20 rate was not made on a mileage basis. It was selected arbitrarily as being a round sum fairly remunerative to the railroads, and satisfactory to the public."

The Pennsylvania's Bituminous Tonnage in 1906.

The total tonnage of bituminous coal and coke originating on the Pennsylvania Lines East of Pittsburgh and Erie during the calendar year 1906 shows an increase of 8 per cent. over the figures for 1905, as compared with an increase of 17 per cent. of the 1905 shipments over those in 1904. The tonnage figures are as follows:

	1906.	1905.	1904.	1903.
Bituminous coal	32,398,081	30,386,521	27,046,243	27,780,425
Coke	12,732,989	11,327,153	8,685,619	9,028,399

Phoebe Snow on Her Travels.

The following yarn is going the rounds of the street, but I cannot vouch for its accuracy. Some days ago President W. H. Truesdale, of the Lackawanna Railroad, and President Underwood, of the Erie System, chanced to meet on Broadway. Their short conversation soon developed into "shop," and when Cortlandt street was reached, Truesdale abruptly excused himself, and walking across the street, spoke to a young lady who had been going in the opposite direction. Underwood, while tapping his foot impatiently on the curbstone, noticed the damsel was dressed in black from head to foot and was a brunette of the most pronounced type.

Mr. Truesdale returned to his companion shortly, however, and Mr. Underwood sarcastically remarked: "Huh! Must be a person of some importance. Thought her a creole or a Spaniard." "That's Phoebe Snow," responded Truesdale. "What!" exclaimed Underwood. "Yes," retorted Truesdale, "that's Phoebe Snow. She just arrived in New York from Buffalo over the Erie Railroad."—*Boston News Bureau*.

Additional Electrical Equipment for the West Jersey & Seashore.

Because of the increased traffic on the Camden-Atlantic City electric trunk-line, it has become necessary to add to the present rolling stock 21 cars. Both the new cars and the generating apparatus necessary to care for the extra load are similar to the present equipment. Each of the cars will be driven by a GE-69 (200 h.p.) double motor equipment and will be fitted with the Sprague-General Electric Type M control.

At the Westville power house a fourth 2,000-kilowatt, 6,600-volt, 25-cycle, three-phase, Curtis steam turbo-generator will be installed. Additional boiler capacity with the necessary condenser and feed pumps, switchboards, etc., will also form a part of the new equipment, as well as a 75-kilowatt, 125-volt, horizontal Curtis steam turbo-generator for excitation purposes. Three extra 700-kilowatt, air-blast transformers will step up the generator voltage to 33,000 volts for transmission.

Six 1,000-kilowatt rotary converters will be distributed in the sub-stations; one each at South Camden, Glassboro, Newfield, Miz-

pah, Atlantic City, and one at the Westville power house. The accompanying air-blast transformers for these machines have a capacity of 370 kilowatts each, three being installed with each of these rotaries. The Pennsylvania Railroad has ordered all the additional apparatus from the General Electric Company, which also furnished and installed the initial equipment.

Manufacturing and Business.

James H. Baker, Vice-President and General Manager of the Solid Steel Tool & Forge Co., has been elected President of that company.

The Buckeye Jack Manufacturing Co., Louisville, Ky., has shipped a carload of "Buckeye" jacks to the Isthmian Canal Commission to be used in the construction of the Panama canal.

Robert M. Burns & Co., Chicago, have sold to the Condon-Lane Boom & Lumber Co. ten 60,000-lb. flat cars; to M. C. Peters Mill Co. two tank cars, and to the American Bridge Co. one 60,000-lb. flat car.

Nathaniel Haven, at one time President of the Baltimore Bridge Co., died in New York City January 15. He was born in 1863 and was for many years connected with the Union Bridge, becoming an officer of the American Bridge Co. later and then going to the Baltimore Bridge Co. as President.

The third annual dinner of the M. H. Treadwell Company, 95 Liberty street, New York City, was given at Rector's, Jan. 12. Covers were laid for 32. This is an annual courtesy extended by the company to its office employees, superintendents and foremen, to assist in promoting sociability and good fellowship. Toasts were responded to by J. H. Killinger, President; H. N. Dougherty, Vice-President; M. H. Treadwell, Treasurer; A. F. Colling, Purchasing Agent; A. H. Stein, Assistant Secretary; W. E. Farrell, Manager of Lebanon plant, and R. McCarty, Manager of Myerstown plant.

The sales of "Thor" pneumatic tools and appliances during 1906 increased 50 per cent. over 1905, and the Independent Pneumatic Tool Co. is now several months behind in its orders. The company has purchased a large four-story brick building adjoining its plant at Aurora, Ill., which will give it approximately 100,000 sq. ft. of additional floor space, and there will be installed there about \$65,000 worth of additional machinery. The company expects to double its output this year. A. B. Holmes, Secretary of the company, has also been elected Treasurer, effective January 16th. The Board of Directors at a recent meeting declared a regular quarterly dividend of 3 per cent.

The Southern Steel Co. is to erect a plant at Gadsden, Ala., to build pressed steel cars. The wire and nail mill of the Southern Steel Co. is using only about one-half of the output of steel, amounting to about 400 tons per day, and the remainder is to be used in the manufacture of cars. It is the first plant of this kind to be erected in the south. The company has an authorized capital stock of \$16,000,000, including \$6,000,000 preferred and \$10,000,000 common. It was incorporated in Alabama in 1905 as a consolidation of the Alabama Steel & Wire Company and the Underwood Coal & Iron Company. The President is Everett T. Schuler. Among the directors are R. B. Van Cortlandt, Moses Taylor, John Bindley, C. Van Camp, Harrison B. Schuyler and George H. Shuler.

The DuBois Iron Works, DuBois, Pa., has taken over the entire business of the Lazier Engine Mfg. Co., Buffalo, N. Y. The DuBois Iron Works has been manufacturing gas and gasoline engines for a number of years under the patents of Arthur A. Lazier, former Vice-President and General Manager of the Lazier Engine Mfg. Co., who has sold out his interests and retires from the business management and company. Numerous improvements and changes will be made in the "DuBois" engines (the name they will be sold under), and they will be built to operate on natural, illuminating and coke oven gas, gasoline, alcohol, distillate, crude oil and kerosene in sizes ranging from 5 h.p. to 300 h.p. Peter Eyeremann, one of the foremost gas engine designers and engineers in Germany, is chief of the engineering department, and under his supervision the improved "DuBois" engines will be produced. The company will continue to manufacture the Simplex steam pump. The officers of the company are: John E. DuBois, President; W. C. Pentz, Vice-President; E. A. Badger, Secretary and Treasurer; I. N. Hamilton, General Manager. The sales and advertising department will be in the hands of Mr. C. E. Stuart. The head office will be at DuBois, Pa., and at Buffalo a branch office will be retained, together with branches in the principal cities throughout the country.

Iron and Steel.

The Coeur d'Alene & Spokane has ordered 6,000 tons of rails.

The Edmonton (Alberta) city council has ordered 470 tons of 80-lb. rails for the municipal street railway system from the Carnegie Steel Company, Pittsburgh.

The Chesapeake & Ohio has ordered 1,000 tons of rails, the Aberdeen & Rockfish 3,000 tons, the Jersey Central Traction 1,200 tons; about 3,000 tons more have been ordered by other companies.

The Chicago, Milwaukee & St. Paul has ordered steel for three bridges over the Missouri river, which call for 6,600 tons. The Great Northern and Lehigh Valley have also ordered structural steel.

The New York, Ontario & Western has given an order to the Baltimore Bridge Company for 140 tons of steel. Other bridge contracts include the Youngstown & Ohio River, 350 tons; Lake Erie & Pittsburg, 250 tons, and Cleveland Short Line, 1,300 tons.

The Atlantic & Birmingham Construction Company has given an order for 2,500 tons and the Louisville & Nashville for 800 tons of bridge material to the American Bridge Company. The Westinghouse Electric & Mfg. Company is in the market for 2,500 tons to be used on an addition to its buildings.

OBITUARY NOTICES.

James W. Musson, who was from 1885 to 1892 General Traffic Manager of the West Shore and more recently General Superintendent of the Car Department of the Merchants Despatch Transportation Company, died recently at Rochester, N. Y. He was 75 years old, a Canadian, and had had an extensive railroad service.

Major Charles Frederick Livermore, a former Treasurer of the Michigan Central, who was connected with the Detroit & Mackinac, died recently at Detroit at the age of 77. He was born in Cambridge, Mass., on March 18, 1830, and graduated from Harvard College in the class of 1853, and from the Lawrence Scientific School of Harvard University in 1856.

Mrs. A. E. Mitchell died of pneumonia at her home, No. 430 Seneca street, Bethlehem, Pa., on Tuesday morning, January 22, after a short illness. Mr. Mitchell, late Superintendent of Motive Power of the Lehigh Valley Railroad, has for years been among the best known and highly esteemed members of the Master Mechanics' Association and of the other engineering associations to which he belongs. His many reports, papers and discussions at the conventions have given him high standing, while his manly qualities make people like him. Mrs. Mitchell usually accompanied him where ladies were invited, and her qualities, both as hostess and guest, gave pleasure to her husband's friends.

A. R. Eldridge, Assistant Bridge Engineer of the Chicago, Burlington & Quincy, Chicago, was killed on January 17 by the accidental discharge of a pistol which he was cleaning. Mr. Eldridge was born in Americus, Ga., in September, 1867. He graduated from Rensselaer Polytechnic Institute, Troy, N. Y., when he was 20 years old and started as locating engineer on the Louisville Southern Ry. He worked in the mines at Shamokin, Pa., for a short time, and in 1889 was in the maintenance of way department of the Alabama Midland R. R. His successive services were: Engineer in the bridge department of the Chicago Board of Public Works; Assistant Engineer of Maintenance of Way of the Savannah, Americus & Montgomery R. R.; City Engineer of Saratoga Springs, N. Y.; four years owner and editor of the *Americus Evening Herald*, and Assistant Bridge Engineer of the Chicago, Burlington & Quincy in September, 1905. He was a member of the American Society of Civil Engineers, Western Society of Engineers and the Franklin Institute.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad conventions and engineering societies, see advertising page 24.)

Railway Club of Pittsburg.

At a meeting of this club to be held at the Monongahela House, January 25, James P. Wilson will present a paper on the liability for personal injuries between employer and employee.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

Baltimore & Ohio.—David C. Green, Assistant Secretary of the Baltimore & Ohio and of the Long Island, has resigned, effective February 1.

Cleveland, Akron & Columbus.—Joseph Wood, First Vice-President of the Pennsylvania Lines West, has been elected President, succeeding James McCrea.

Delaware & Eastern.—Joseph J. Jermyn and Joseph Holmes have been elected additional directors. Frank L. Phillips has been elected Vice-President.

Fonda, Johnstown & Gloversville.—Chauncey M. Depew, Chairman of the Board of Directors of the New York Central & Hudson River, has resigned as a Director.

Grand Rapids & Indiana.—Joseph Wood, First Vice-President of the Pennsylvania Lines West, has been elected President, succeeding James McCrea, resigned.

Interborough-Metropolitan Company.—Theodore P. Shonts, Chair-

man of the Isthmian Canal Commission, has been elected President of the Interborough-Metropolitan, succeeding August Belmont. See Interborough Rapid Transit Company.

Interborough Rapid Transit Company.—August Belmont, President of this company and of the Interborough-Metropolitan Company, has been elected Chairman of the Board of Directors of the Interborough Rapid Transit. E. P. Bryan, Vice-President, succeeds Mr. Belmont as President of the Interborough Rapid Transit. John B. McDonald has been elected Vice-President, with general supervision of construction of new subways.

Isthmian Canal Commission.—Theodore P. Shonts, Chairman of the Isthmian Canal Commission, has resigned. See Interborough-Metropolitan Company.

Kansas City Southern.—R. J. McCarty, Assistant Secretary and Auditor, has been appointed Vice-President and Auditor, with office at Kansas City, Missouri.

Long Island.—See Baltimore & Ohio.

Midland Valley.—The jurisdiction of J. F. Holden, Vice-President of the Midland Valley, has been extended over the operating department, with title of Vice-President and General Manager; office at Muskogee, Ind. T.

Norfolk & Western.—Joseph Wood, First Vice-President of the Pennsylvania Lines West, has been elected a Director, succeeding James McCrea, resigned.

Pennsylvania.—Charles E. Ingersoll has been elected a Director, succeeding James McCrea, now President.

Pennsylvania Lines West.—Edward B. Taylor, who is now Third Vice-President of the Pennsylvania Company and the Pittsburg, Cincinnati, Chicago & St. Louis, and Second Vice-President of the Vandalia, was born on February 6, 1850, near Riverton, New Jersey. He graduated from Haverford College in 1869 as a Bachelor of Arts, and from the Polytechnic College of the state of Pennsylvania in 1870, as a Bachelor of Civil Engineering. On July 25, 1870, he entered railroad service with the Pennsylvania at Harrisburg as a rodman and clerk in the Superintendent's office of the Middle division. In September, 1871, he was made supervisor, and in 1872 Assistant Engineer in charge of Maintenance of Way of the Middle division. In January, 1875, he became Assistant Engineer of the Pittsburg division, and in July 24, 1876, Superintendent of the Lewistown division. Two and a half years later, on January 1, 1879, he was transferred to the Western Pennsylvania division, and again on April 1, 1881, to his present territory on the Lines West as Superintendent on the Pittsburg, Cincinnati, Chicago & St. Louis. He was appointed General Superintendent of the Northwest System of the Pennsylvania Lines West in April, 1888, and on March 1, 1890, General Superintendent of Transportation of all the Lines West. This position he held for over 10 years. On January 1, 1902, he was elected Fourth Vice-President of the two most important companies of the Western system, and also became President of a number of the subsidiary lines. His election as Third Vice-President came on January 9, 1907, and as Second Vice-President of the Vandalia on January 14 of the present year. His headquarters are at Pittsburg.

D. T. McCabe, who has been appointed Fourth Vice-President of the Pennsylvania Lines West, in charge of traffic, and a Director and Member of the Executive Committee of the two important underlying corporations, as well as Third Vice-President of the Vandalia, was born at Abingdon, Va., on November 25, 1849. He began work for one of the companies of which he is now Fourth Vice-President, the Pittsburg, Cincinnati & St. Louis, when he was 21 years old, as clerk in the Auditor's office at Columbus, and was soon made claim clerk in the general office of the road. In April, 1872, he was made chief clerk in the general freight office, and in 1876 division freight agent in charge of the Second and Third divisions of the Columbus, Chicago & Indiana Central. In April, 1883, when that road passed into the control of the Pittsburg, Cincinnati, Chicago

& St. Louis, Mr. McCabe was made General Freight Agent at Chicago. One year later he became western freight agent and division freight agent of the Second, Third and Fourth divisions of the consolidated road. Next he was Assistant General Freight Agent of the Pittsburg, Cincinnati, Chicago & St. Louis, and the Chicago, St. Louis & Pittsburg at Columbus. He became General Freight Agent in 1892, and in 1897 he was appointed Freight Traffic Manager of the Pennsylvania Lines West, from which he was promoted to his present executive post.

Wiscasset, Waterville & Farmington.—Carson C. Peck, 280 Broadway, New York, has been elected President of the reorganized company; William D. Patterson, who has been Receiver, Treasurer, and Samuel J. Sewall, who has been Superintendent, General Manager.

Operating Officers.

Canadian Northern Ontario.—Fred M. Spaidal, who has been appointed General Superintendent of the Canadian Northern Ontario, with headquarters at Toronto, was born on November 13, 1858, at Gananoque, Canada. After a high school education he entered railroad service in June, 1876, on the Grand Trunk, where he was operator, agent and despatcher until 1883; he then went to the Union Pacific, where he served in the same capacities, and two years later to the Canadian Pacific as despatcher, chief despatcher, Trainmaster and Superintendent. He leaves the position of Superintendent on the Canadian Pacific to become General Superintendent of the Canadian Northern line.

Canadian Pacific.—D. E. Brown has been appointed General Superintendent of the Pacific service, with headquarters at Vancouver, British Columbia.

Chicago & North-Western.—S. M. Braden, Superintendent at Chicago, has been appointed General Superintendent of the lines west of the Missouri river, with headquarters at Norfolk, Neb., succeeding C. C. Hughes, resigned.

Chicago, Rock Island & Pacific.—Garrett Davis, District Engineer at Cedar Rapids, Iowa, has been appointed Superintendent of the Minnesota division, with headquarters at Cedar Rapids. This is one of the new divisions.

M. McKernan has been appointed Superintendent of the new Fort Worth division, with headquarters at Fort Worth, Tex. U. S. Rea, Trainmaster at Oklahoma City, has been appointed Trainmaster of the division, with headquarters at Fort Worth, succeeding L. D. Hess, resigned.

Cincinnati Southern.—W. P. Caldwell, formerly Superintendent of Terminals of the St. Louis, Iron Mountain & Southern at Little Rock, Ark., has been appointed Inspector of Transportation.

Colorado & Southern.—Alfred Pardoe, who has been appointed Car Accountant, with office at Denver, Colo., was born on May 17, 1878, at Roca, Nebraska. He was educated in the public schools of Ulysses and Lincoln, Neb., and Denver, Colo., and began railroad work in October, 1895, as a messenger on the Union Pacific. In 1897 he was made inspector of the Colorado Car Service Association, and in 1898 clerk in the Auditor's office of the Colorado Midland. In May, 1899, he went to the Colorado & Southern as clerk in the Car Accountant's office, becoming chief clerk in December, 1904, from which he has been promoted to his present post of Car Accountant.

Deepwater.—See Tidewater.

Erie.—Robert S. Parsons, Engineer of Maintenance of Way, with headquarters at Cleveland, Ohio, has been appointed Assistant General Superintendent of the Ohio division, and of the Chicago & Erie, with office at Cleveland. The office of Engineer of Maintenance of Way has been abolished.

J. C. Tucker, Superintendent of the Allegheny & Bradford divisions, has been appointed Superintendent of the Rochester division, succeeding George W. Dowe, transferred to be General Agent at Port Jervis, N. Y. E. I. Bowen, Trainmaster of the Allegheny & Bradford divisions, has been appointed Superintendent, succeeding Mr. Tucker.

F. M. Hawley has been appointed Trainmaster of the Allegheny and Bradford divisions, succeeding E. I. Bowen, promoted.

Galveston, Houston & Henderson.—J. H. Lister has been appointed Acting Manager, in the absence of J. H. Hill. W. F. McClure, General Freight and Passenger Agent, has been appointed also Assistant to the Manager.

Georgia, Florida & Alabama.—W. B. Denham, General Manager of the Georgia, Florida & Alabama and the Carrabelle, Tallahassee & Georgia, has resigned, effective February 1, to take charge of the Tampa Northern, building from Tampa, Fla., to Atlanta.

Grand Trunk.—W. R. Tiffin, Superintendent of the Northern division, has been granted a leave of absence. P. J. Lynch, Assistant Superintendent, will have full charge of the division during Mr. Tiffin's absence, with headquarters at Allandale, Ontario.



E. B. Taylor.

Missouri, Kansas & Texas of Texas.—T. A. Wilson, Trainmaster of the M., K. & T., with headquarters at Denison, Tex., has been appointed Superintendent of the Missouri, Kansas & Texas of Texas, with headquarters at Smithville, Tex., succeeding J. H. Davisson, resigned on account of ill health.

Missouri Pacific.—P. A. Buck, Chief Clerk to Vice-President Clarke, has been appointed Superintendent of the Illinois division, with headquarters at Chester, Ill., succeeding B. G. Fallis, resigned.

Pacific & Idaho Northern.—C. M. Hunt has been appointed Superintendent of the Pacific & Idaho Northern, with headquarters at Weiser, Idaho.

Raleigh & Charleston.—L. E. Boyd has been appointed General Manager, with headquarters at Marion, S. C., succeeding J. M. Turner, resigned to accept service with another company.

Sonora Railway.—Epes Randolph, President of the Gila Valley, Globe & Northern and other Southern Pacific allied lines in Arizona and Mexico, has been appointed General Manager, with headquarters at Tucson, Ariz., succeeding E. E. Calvin, resigned on account of pressure of other duties.

Southern Pacific.—See Sonora Railway.

Tidewater.—H. P. Reigart, Purchasing Agent, has been appointed Assistant General Manager of the Tidewater and Deepwater railways. He will also continue to act as Purchasing Agent.

Union Pacific.—E. W. Botsford, Trainmaster at Salt Lake City, has been appointed Assistant Superintendent of the Utah division of the Oregon Short Line, with headquarters at Ogden, Utah, succeeding J. K. Roth, resigned.

Illinois Central.—Frank B. Harriman, who has been appointed General Manager of the Illinois Central, succeeding I. G. Rawn, was born on December 23, 1861, at Nora, Illinois. He was educated in the public schools of Dubuque, Iowa, and began railroad work in 1879. All of his service has been on the Illinois Central. For eleven years he was in the engineering department, four years as an apprentice, three years as assistant roadmaster and three years as construction engineer on branch lines. In 1890 he was appointed Trainmaster on the Cherokee and Freeport divisions, and on August 1, 1892, Superintendent of the Freeport division. On January 1, 1895, he was made also Superintendent of the Dubuque division, and in 1903 Superintendent of the Chicago division. He was promoted in 1905 to be General Superintendent of the lines north of the Ohio river, a post which he leaves to become General Manager of the whole road.



F. B. Harriman.

Traffic Officers.

Alabama Great Southern.—See Cincinnati, New Orleans & Texas Pacific.

Canadian Pacific.—C. E. E. Ussher, General Passenger Agent of the Eastern lines, has been appointed Assistant Passenger Traffic Manager of the western lines, with office at Winnipeg, Manitoba. William Stitt, General Passenger Agent of the Canadian-Australian Line at Sydney, N. S. W., has been appointed General Passenger Agent of the Eastern lines, succeeding Mr. Ussher.

Central of New Jersey.—Arthur Tomalin, news editor of the *Newark Evening News*, has been appointed General Advertising Manager of the Central of New Jersey, and editor of its monthly magazine, *The Suburbanite*, with office at New York.

Chicago, Milwaukee & St. Paul.—E. C. Nettles, Division Freight and Passenger Agent at Des Moines, Iowa, has been appointed Assistant General Freight Agent, with headquarters at Chicago.

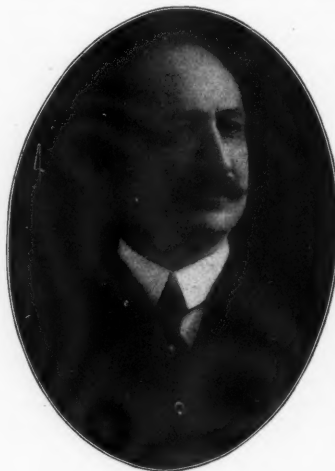
Cleveland, Akron & Columbus.—See Vandalia.

Delaware & Hudson.—Ira H. Shoemaker has been appointed Industrial Agent, with headquarters at Albany, N. Y., succeeding W. A. Moyer, deceased.

New York, New Haven & Hartford.—F. C. Coley, Assistant General Passenger Agent, has been appointed General Passenger Agent of the New England Navigation Company, controlling the Sound

steamboat lines of the New York, New Haven & Hartford, with office at Pier 10, North river, New York City.

Cincinnati, New Orleans & Texas Pacific.—George P. Biles, who has been appointed Freight Traffic Manager of the Cincinnati,



George P. Biles.

New Orleans & Texas Pacific and the Alabama Great Southern, was born in Dorset County, England, on July 18, 1859, where he received a common school education. His railroad service was begun in England in May, 1874, as ticket clerk on the London, Brighton & South Coast Railway. He came to this country in September, 1883, and became rate clerk in the general freight department of the Alabama Great Southern at Chattanooga, Tenn. On January 1, 1884, he was transferred to the headquarters of the Queen & Crescent System at Cincinnati, being chief rate clerk from July, 1886, to May, 1888. In 1888 he was made Assistant General Freight Agent. From October, 1895, when the Queen & Crescent System was dissolved, up to January 1, of the present year, he was General Freight Agent of the Cincinnati, New Orleans & Texas Pacific, from which position he has been promoted to Freight Traffic Manager of the two northern roads in the Queen & Crescent Route.

Pennsylvania Lines West.—William Hodgdon, Freight Traffic Manager of the Vandalia, has been appointed Freight Traffic Manager of the Pennsylvania Lines West, succeeding D. T. McCabe, now Fourth Vice-President.

Trinity & Brazos Valley.—W. C. Connor, Commercial Agent of the St. Louis & San Francisco at Houston, Tex., has been appointed General Freight Agent, with headquarters at Fort Worth.

Vandalia.—George W. Davis, General Freight Agent of the Cleveland, Akron & Columbus, and Commercial Agent of the Pennsylvania Lines West at Columbus, has been appointed General Freight Agent, succeeding William Hodgdon, who has been appointed Freight Traffic Manager of the Pennsylvania Lines West. Frederick E. Sawyer, division freight agent of the P., C., C. & St. L., at Louisville, Ky., succeeds Mr. Davis.

Engineering and Rolling Stock Officers.

Alabama Great Southern.—See Cincinnati, New Orleans & Texas Pacific.

Atchison, Topeka & Santa Fe Coast Lines.—F. S. Guinn has been appointed Road Foreman of Engines of the First district, and Walter Reid, Road Foreman of Engines of the Second district, both with headquarters at Needles, Cal.

Baltimore & Ohio.—E. J. Lander, Engineer of the New Castle division, has been appointed Engineer of Maintenance of Way of the Pittsburg system, including the New Castle, Pittsburg and Connellsville divisions, with headquarters at Pittsburg, succeeding H. H. Temple, recently appointed Superintendent of the New Castle division. A. M. Funk, Assistant Engineer of the New Castle division, succeeds Mr. Lander, with headquarters at New Castle, Pennsylvania.

Baltimore & Ohio.—William Trapnell, Division Engineer of the Philadelphia division, has been appointed Division Engineer of the Baltimore division, succeeding V. K. Hendricks, resigned to go to another road. Mr. Trapnell was born on May 22, 1876, at Charleston, W. Va., and is a graduate of Purdue University. He began railroad work in 1897 as chairman on an engineering corps in the maintenance of way department of the Atchison, Topeka & Santa Fe. In 1901 he went to the Baltimore & Ohio as transitman on third track work near Rowlesburg, W. Va., and was later made Assistant Engineer of Maintenance of Way at Cumberland, Md. In June, 1903, he became Assistant Division Engineer at Philadelphia; from June, 1903, to December, 1904, he was Assistant Engineer of the Shenandoah division, and was made Division Engineer at Philadelphia in 1904. Mr. Trapnell is succeeded at Philadelphia by A. A. Miller.

Mr. Miller is a graduate of Ohio State University, and all of his railroad work has been on the Baltimore & Ohio. He was with the Cleveland, Lorain & Wheeling during the summer of 1900, and with the Ohio & Little Kanawha for three months in 1901. During the summer of 1902 he was Assistant Engineer

of the Wheeling division, thence being transferred to the Cleveland division, where he remained until January, 1903, when he was put in charge of the track inspection car, with headquarters in the office of the Chief Engineer of Maintenance of Way. He leaves this post to become Engineer of the Philadelphia division.

Cincinnati, New Orleans & Texas Pacific.—Charles Dougherty, Superintendent of the Springfield division of the Illinois Central, has been appointed Assistant Chief Engineer of the C., N. O. & T. P., and the Alabama Great Southern, with headquarters at Cincinnati, Ohio, effective February 1. See Seaboard Air Line.

Erie.—See Erie under Operating Officers.

Grand Trunk.—George R. MacLeod, chief clerk to the Fourth Vice-President, has been appointed Resident Engineer, with headquarters at Toronto, Ont., succeeding F. L. Somerville, resigned.

Illinois Central.—Charles Dougherty, Superintendent of the Springfield division, has resigned, effective February 1.

New York Central & Hudson River.—The headquarters of D. L. Somerville, Division Engineer, are to be changed from Buffalo to Syracuse, effective February 1.

St. Louis & San Francisco.—W. W. Thomas has been appointed Master Mechanic of the St. Louis, Memphis & Southeastern, with headquarters at Cape Girardeau, Mo., succeeding William Henry, who has been appointed Assistant Master Mechanic of the Southwestern division, with headquarters at Memphis, Tennessee.

San Antonio & Aransas Pass.—J. S. Peter, formerly Chief Engineer of the Chicago, Rock Island & Gulf, has been appointed Engineer of Maintenance of Way, succeeding W. Berry, resigned.

Seaboard Air Line.—J. C. Nelson, Assistant Chief Engineer of the Queen & Crescent Route, has been appointed to the new office of Engineer of Maintenance of Way.

Wheeling & Lake Erie.—Robert Blickensderfer, Consulting Engineer, has resigned.

Purchasing Agents.

Atchison, Topeka & Santa Fe.—F. E. Connors, Chief Clerk in the Purchasing Department, has been appointed Assistant General Purchasing Agent.

Chicago, Indiana & Southern.—William McMasters has been appointed Assistant Purchasing Agent of the Chicago, Indiana & Southern and the Indiana Harbor (Indiana Harbor Belt).

Cincinnati, New Orleans & Texas Pacific.—S. L. Yerkes has been appointed Fuel Agent, succeeding C. H. Dent, resigned.

Mississippi Central.—C. F. Larson, General Storekeeper, has been appointed Purchasing Agent, with office at Hattiesburg, Miss.

LOCOMOTIVE BUILDING.

The Hocking Valley has asked bids on 26 locomotives.

The Long Island Railroad has asked bids on five locomotives.

The Western Pacific is rumored in the market for 10 locomotives.

The Chicago, Milwaukee & St. Paul has asked bids on 50 locomotives.

The Northern Pacific is in the market for 25 switching (0-6-0) locomotives.

The Delaware & Hudson has asked bids on eight locomotives for its lines in Canada.

The Southern Railway will have one special exhibition locomotive built to be shown at the Jamestown Exhibition this summer.

The Santa Clara Raw Sugar Company will shortly be in the market for narrow-gauge locomotives for a 30-mile plantation railroad in Cuba.

The Evansville & Terre Haute denies having ordered eight locomotives from the Baldwin Locomotive Works, as reported in our issue of January 18.

The Chesapeake & Ohio has ordered one special exhibition locomotive from the American Locomotive Company, to be shown at the Jamestown Exhibition.

The Atlantic Coast Line, as reported in our issue of December 28, has ordered 80 locomotives from the Baldwin Locomotive Works, and it is rumored that this order will shortly be increased to 100 locomotives.

The Canadian Pacific is having 85 locomotives built by the American Locomotive Company, Montreal Works, and has ordered 25 locomotives from the Richmond Works of the same company. It has also ordered 25 locomotives from the Baldwin Locomotive Works.

The South Manchuria Railway will shortly be in the market for several locomotives. The contracts will probably be placed through one or more of the following firms in New York: Mitsui & Co., Takata & Co., Frazar & Sale and Okura & Company.

The Chicago, Milwaukee & St. Paul, as reported in our issue of January 18, will build 45 simple consolidation (2-8-0) and 18 simple ten-wheel (4-6-0) locomotives at its own shops. The specifications are as follows:

Specifications.		
Type	Consolidation.	Ten-wheel.
Total weight	177,000 lbs.	178,000 lbs.
Weight on drivers	156,400 lbs.	131,000 lbs.
Diameter of drivers	56 in.	73 in.
Cylinders	22 in. x 28 in.	20½ in. x 26 in.
Type of boiler	Straight.	Extd. wagon top.
Boiler, wkg. stm. pressure ..	200 lbs.	
" number of tubes ..	321	300
" diameter of tubes ..	2 in.	
" length of tubes ..	14 ft. 6 in.	15 ft.
Firebox, length	9 " 3½ "	8 ft. 11½ in.
" width	5 " 5½ "	3 " 5½ "
" grate area	47½ sq. ft.	30 sq. ft.
Heating surface	2,608 sq. ft.	2,538 "
Tank capacity	7,000 gals.	
Coal capacity	10 tons.	

The special equipment for both is as follows:

Bell ringer	Gollmar
Boiler lagging	Sectional magnesite
Brake-beams	Monarch
Couplers	Munton
Headlights	Adams & Westlake
Injector	Nathan and Simplex
Piston rod packing	Edwards' metallic
Valve rod packing	Edwards' metallic
Sanding devices	Leach
Sight-feed lubricators	Nathan bull's-eye
Steam gages	Ashton
Driving wheel tires	Latrobe
Truck wheel tires	McKee-Fuller
Tender wheel tires	McKee-Fuller

CAR BUILDING.

The Chicago Union Traction is said to be about to order cars.

The Great Northern is reported to be figuring on 40 cabooses.

The Chicago & Milwaukee (Electric) is in the market for 10 motor cars.

The Louisiana & Arkansas has ordered 503 freight cars from Barney & Smith.

The St. Louis & San Francisco is reported to be in the market for 5,000 or 6,000 cars.

The South & Western is figuring on 100 steel underframe flat cars of 100,000 lbs. capacity.

The Kingan Refrigerator Line, Indianapolis, Ind., is in the market for 50 refrigerator cars.

The Nashville, Chattanooga & St. Louis is asking prices on specialties for 25 refrigerator cars.

The Cedar Rapids Refrigerator Express, Cedar Rapids, Iowa, is in the market for 35 refrigerator cars.

The New York, New Haven & Hartford is reported to be in the market for 3,000 to 9,000 freight cars.

The Chesapeake & Ohio is reported to have ordered 1,000 hopper cars from the American Car & Foundry Company.

The Louisville & Nashville is reported to be about to build 500 refrigerator cars at the company's shops at Decatur, Ala.

The Chicago, Rock Island & Pacific is negotiating for about 300 cars, largely box and furniture cars, for replacement.

The Santa Clara Raw Sugar Company will soon be in the market for a number of narrow gauge cars for a 30-mile road in Cuba.

The New York, Ontario & Western has ordered for immediate delivery 50 Hart convertible cars from the Rodger Ballast Car Company.

The Colorado & Southern has ordered 50 standard Hart convertible cars from the Rodger Ballast Car Co., and will shortly place an order for 33 passenger cars with the Pullman Co.

The South Manchuria Railway will shortly be in the market for a large number of cars. The contracts will probably be placed through one or more of the following firms having offices in New York: Mitsui & Co., Takata & Co., Frazar & Sale, and Okura & Company.

The National Railroad of Mexico has ordered 400 wooden box cars, 50 wooden flat cars and 50 wooden stock cars, all of 80,000 lbs. capacity, from the American Car & Foundry Co.; and 200 Otis steel underframe dump gondola cars of 100,000 lbs. capacity from the National Dump Car Co., to be built by the American Car & Foundry Co.

The Mexican International has ordered 200 wooden box cars, 50 wooden flat cars and 50 wooden stock cars, all of 80,000 lbs.

capacity, from the American Car & Foundry Co.; and 300 Otis steel underframe dump gondola cars of 100,000 lbs. capacity from the National Dump Car Co., to be built by the American Car & Foundry Co.

The *East St. Louis & Suburban* has ordered 200 wooden gondola cars of 80,000 lbs. capacity from the Inter-State Car Co., for September delivery. These cars will weigh 31,000 lbs., and measure 35 ft. 7 in. long, 9 ft. 4 in. wide and 3 ft. 6 1/4 in. high, inside measurements. The special equipment includes:

Bolsters	American Steel Foundries
Brake-beams	Damascus
Brakes	Westinghouse
Couplers	Climax
Draft rigging	Miner
Journal boxes	Symington
Springs	Railway Steel Spring Co.

The *Delaware & Hudson*, as reported in our issue of January 11, has ordered 1,500 steel underframe box cars, 1,500 steel underframe hopper cars, and 1,000 steel underframe flat cars with coal sides, from the American Car & Foundry Co. The box cars will be of 60,000 lbs. capacity, 36 ft. long, 8 ft. 6 in. wide and 8 ft. high, inside measurements. The hopper cars will be of 85,000 lbs. capacity, 32 ft. long inside and 8 ft. 11 in. wide inside. The flat cars will be of 85,000 lbs. capacity, 34 ft. 2 1/4 in. long and 9 ft. 4 in. wide. The special equipment for all cars includes:

Axles	Cambria
Brake-beams	Damascus
Brake-shoes	Diamond "S"
Brakes	New York
Draft rigging	Miner

The *Atchison, Topeka & Santa Fe* has increased a recent order with the National Dump Car Co. for 500 combination stock and coke cars to 2,500 steel underframe Caswell stock and coke cars of 80,000 lbs. capacity, delivery from May to August. These cars will weigh about 46,500 lbs., and will measure 40 ft. long, 8 ft. 8 in. wide and 8 ft. high, inside measurements. The special equipment includes the following:

Brake-beams	Kewanee
Brake-shoes	Am. Brake-Shoe & Fdy.
Brakes	Westinghouse
Brasses	Hewitt
Couplers	Janney
Draft rigging	Miner
Dust guards	Soule
Journal boxes	Franklin
Springs	Simplex
Wheels	American Car & Foundry

The *Great Northern*, as reported in our issue of January 18, has ordered 500 steel hopper cars of 100,000 lbs. capacity, and 30 express refrigerator cars of 40,000 lbs. capacity, from the American Car & Foundry Company, for June delivery. The hopper cars will weigh 29,000 lbs. and measure 23 ft. 9 in. long, 8 ft. 11 in. wide over all, and 9 ft. 5 1/2 in. high from rail to top of side. The refrigerator cars will be 35 ft. 7 1/2 in. long inside clear of ice box, 8 ft. 11 in. wide and 7 ft. 11 in. high, inside measurement. The special equipment for both includes the following:

	Hopper cars.	Refrigerator cars.
Bolsters	Commonwealth.	Commonwealth.
Brake-beams	Haskell & Barker.	National Hollow,
Brake-shoes	Tower.	Tower.
Brasses	Farlow.	La Flare.
Couplers	Harrison.	Haskell & Barker.
Draft rigging	Simplex.	Harrison.
Dust guards	Andrews.	Flood & Conklin.
Journal boxes		Simplex.
Springs		
Trucks		

The *Chicago, Milwaukee & St. Paul*, as reported in our issue of January 18, is building 1,000 Haskell & Barker ballast cars of 80,000 lbs. capacity at its Milwaukee shops. These will be followed by 1,000 standard stock cars of 60,000 lbs. capacity, to be followed by 1,000 steel underframe box cars of 80,000 lbs. capacity. The ballast cars will weigh 33,500 lbs. and will be 37 ft. 5 in. long, 8 ft. 6 in. wide and 3 ft. high, inside measurements. The stock cars will weigh 20,300 lbs., and will measure 36 ft. 1 3/4 in. long, 8 ft. 6 3/4 in. wide and 7 ft. 5 1/4 in. high, inside measurements. The box cars will be 41 ft. long, 8 ft. 6 in. wide and 8 ft. 8 1/2 in. high, inside measurements. The special equipment includes the following:

	Box.	Ballast.	Stock.
Bolsters	Bettendorf	Congdon	Congdon
Brake-shoes	Congdon	Congdon	Congdon
Brasses	Hewitt	Hewitt	Hewitt
Couplers	Major	Major	Major
Doors	Security	Haskell & Barker.	Climax
Door fastenings	Westinghouse	Miner.	Hennessey.
Draft rigging	Chicago Improved		
Roofs	Winslow		
Trucks	Bettendorf	Bettendorf	Diamond

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

BLACK MOUNTAIN.—Contracts have been given by this company to the Callahan Construction Company, of Knoxville, Tenn., for building from Pennington Junction, Va., to Imboden, 17 1/2 miles; also for spurs to coal mines, 5 1/2 miles. E. S. Fraser, Chief Engineer, Bristol, Tenn. (See Construction Record.)

BUFFALO & LAKE ERIE TRACTION.—This new company is a consolidation of the Buffalo, Dunkirk & Western, the Lake Erie Electric Traction, and the Dunkirk & Fredonia, previously consolidated with the Hamburg Railway and later consolidated with the Erie Rapid Transit Company. Plans are being made by the new company to complete an electric line from Buffalo to Erie, Pa. Joseph B. Mayer, of New York, is President.

BUFFALO CREEK & GAULEY.—This company, which built three miles of road last year in West Virginia, is about to let contracts for an extension of two miles. The company has projected an additional 37 miles, for which surveys have been made from the present end of track to Camden-on-Gauley. Address William D. Janney, Clay, W. Va. (See Construction Record.)

BURRS FERRY, BROWNDEN & CHESTER.—An officer writes that this company, which last year completed about eight miles of road in Texas is making surveys for building an extension from Aldridge, Tex., east to Brownell, 20 miles. A. A. Brooks, Auditor, Houston, Tex. (Nov. 30, p. 152.)

DULUTH, RAINY LAKE & WINNIPEG.—This road now runs from Virginia, Minn., northwest to the Canadian boundary at Rainier, where connection is made with the Canadian Northern. At its southern terminus connection is made with the Duluth, Missabe & Northern and the Duluth & Iron Range. The road now has 100 miles of main line and 60 miles of branches, spurs and sidings, with terminals, forming with its connections the shortest route by 80 miles between Duluth and Winnipeg. It will have a large tonnage of lumber.

EASTERN SIERRA & PACIFIC.—This company, recently incorporated under the name of the Sierra Pacific, has consolidated with two other companies and has increased its capital stock from \$5,000,000 to \$15,000,000. Construction work is to begin near Walker Pass, Cal., from which place the main line is to be built to San Luis Obispo. The work will be let in sections of about 40 miles each. The officers of the consolidated company are: Otto Bashore, President, Porterville, Cal.; C. B. Reas, Second Vice-President, of Success; George D. Avery, Secretary; J. W. Davis, Treasurer, and G. B. Mitchell, General Manager, all of Porterville. (Nov. 23, p. 146.)

GALVESTON TERMINAL COMPANY.—President Sweeney, of this company, and Vice-President and General Manager of the Trinity & Brazos Valley, is quoted as saying that work on extensive terminals for the Yoakum roads in Galveston will soon be started. The company owns 14 blocks of land in Galveston which will be used as a site for the proposed terminals. In addition the Rock Island has water front property, which is to be improved for the joint use of that company and the Frisco, and will form part of the extensive port improvements. The plans call for the expenditure of about \$1,000,000 by the Galveston Terminal Company.

GENEVA, PHELPS & NEWARK (ELECTRIC).—This company was recently granted a certificate of necessity to build an electric line from Geneva, Ontario County, N. Y., north through Phelps, to Newark, Wayne County, 15 miles.

GRAND TRUNK.—Application, it is said, is being made by this company for permission to build a new line from Port Union along the shore of Lake Ontario into Toronto, about 20 miles.

GREENWICH & JOHNSONVILLE.—An officer writes that an extension is to be built by the company's men from Greenwich, N. Y., to Salem, 12 miles. A. A. Parker is Superintendent of Construction.

GULF, BROWNWOOD & CISCO.—An officer writes that this company expects to build during 1907 a line from Brownwood, Tex., to Cisco, 50 miles. Address G. H. Connell, Fort Worth, Tex.

GULF, COLORADO & SANTA FE.—Contracts have been given to the Grigsby Construction Company, of De Ridder, La., for extending the Jasper & Eastern from Cravens, La., to Oakdale, 25 miles.

HARBOR SPRINGS.—Surveys are being made for an extension from Indian Garden, Mich., to Dutch Church, two miles.

INDIANAPOLIS, CHICAGO & LOGANSPOUT.—An officer writes that work is to be started early this year. Surveys have been made and rights of way secured from Indianapolis, Ind., north to Logansport, about 80 miles. Walter A. Osmer, Chief Engineer, Logansport, Ind.

JASPER & EASTERN.—See Gulf, Colorado & Santa Fe.

JOHNSON CITY SOUTHERN.—See Southern.

MEXICAN NATIONAL.—It is reported in Mexico City, that this company will build its extension to the Port of Tuxpan, Mex., 156 miles, this year. Surveys are now being made, and grading is to be started this month. The work includes a number of tunnels and several drawbridges. It is said that the Government will also make extensive improvements at Tuxpan to make that place a deepwater harbor.

NEW LONDON & EAST LYME STREET RAILWAY.—Application will

be made to the Connecticut Legislature for permission to extend this road from Niantic to the Connecticut river.

NEW YORK, NEW HAVEN & HARTFORD.—The contract for six-tracking the Harlem River branch of this road from Harlem river to New Rochelle, N. Y., previously let to the New York Contracting & Trucking Co., has been let to Daly & Holbrook.

NORTH NEW MEXICO & GULF.—This company is building a line from Espanola, N. Mex., to Abiquin, 25 miles, and is making surveys for an additional 10 miles from Abiquin. (See Construction Record.)

PHILIPSBURG RAILROAD.—Incorporated in Pennsylvania with \$250,000 capital to build from Chester Hill, Pa., to Jaynesville, 18 miles. David F. Kreh, Clearfield, is President.

PITTSBURG & LAKE ERIE.—According to reports from Pittsburg, this road is to be extended from Youngstown, Ohio, to Cleveland, 70 miles. The road at present runs from Pittsburg, Pa., to Youngstown, Ohio, 68 miles, from which point it uses the tracks of the Erie to Cleveland.

RICHMOND & CHESAPEAKE BAY (ELECTRIC).—An officer writes that this company has completed nine miles of its proposed line from Richmond, Va., north to Ashland, and that work is under way on the remaining six miles. The company has projected an extension from the proposed northern terminus at Ashland to Toppohannock, an additional 42 miles.

ROGERS SOUTHWESTERN.—This company, which last year built 22 miles of road in Arkansas from Rogers to Springtown, has given contracts to the W. R. Felker Construction Co., of Rogers, Ark., for extending its road from Springtown, Ark., to Siloam Springs, 10 miles.

ST. LOUIS & SAN FRANCISCO.—Plans are being made for building a line from Paris, Tex., to a connection with the Trinity & Brazos Valley at a point south of Palestine, and surveys have been completed. This is thought to be a project of the Frisco, to give a direct connection from its Paris-St. Louis lines to the Trinity & Brazos Valley, which is controlled jointly by the Colorado & Southern and the Rock Island Company.

ST. LOUIS, VANDALIA, TERRE HAUTE & EASTERN TRACTION.—An officer writes that this proposed electric line has been surveyed from Terre Haute, Ill., to Dexter, 80 miles, and will soon be transferred to a new company. P. Chase, Decatur, Ill., is interested.

SAVANNAH, AUGUSTA & NORTHERN.—Incorporated in Georgia with \$8,000,000 capital to build from Savannah, Ga., to Rossville, on the Georgia-Tennessee state line south of Chattanooga. The names of the incorporators are not given.

SIERRA PACIFIC.—See Eastern Sierra & Pacific.

SOUTHERN.—An officer writes that work has been suspended on the Johnson City Southern, projected from Marion, N. C., to Johnson City, 80 miles. Part of the grading is finished.

TRINITY & BRAZOS VALLEY.—The following announcement has been issued in regard to the new lines under construction:

Portions of the new line are still under construction, but we now expect to open the line between Fort Worth and Houston on January 28, 1907, when local daylight passenger service will be begun in each direction between those terminals. A couple of months later we expect to open the Dallas division, when similar service will be established between Dallas and Houston in each direction. It is the intention to thoroughly ballast the new roadbed and get the track in perfect condition for quick and punctual schedules before inaugurating through sleeping car and coach service on night trains between Fort Worth, Dallas and Houston and Galveston in both directions, and the general interchange of through passenger traffic with connecting lines. The ballasting and surfacing of the new track will require several months yet.

UTICA SOUTHERN (ELECTRIC).—This company has been incorporated in New York with \$600,000 capital to build 26 miles of electric road in Oneida and Madison Counties, New York. The directors include M. W. Terry, of Waterville; F. K. Baxter, of Utica, and W. M. West, of Hamilton.

VIRGINIA & SOUTHWESTERN.—Contracts let to the Callahan Construction Co., of Knoxville, Tenn., for extending this road from Moccasin Gap, Va., to Persia, Tenn., 37½ miles. E. S. Fraser, Bristol, Tenn., is interested.

WASHINGTON, WESTMINSTER & GETTYSBURG.—An officer writes that this company has made a contract with Ira Taylor, 20 Broad street, New York, for building its line from Washington, Va., north-east to Gettysburg, Pa., 90 miles. I. B. Colegram, President, Sterling, Va.

WESTERN PACIFIC.—The land department of the Central Pacific has announced that an agreement has been made by which the Central Pacific is to sell a right of way 280 miles long through Nevada to the Western Pacific, disputes to be settled by arbitration. This right of way is mostly on land granted to the Central Pacific by

the United States Government. Following is an official statement of the present progress of the Western Pacific construction work:

Of the 122 miles of the road in Utah, over 100 miles have been completed and construction trains are being operated. The property for the terminals in Salt Lake City has been purchased and work upon the buildings will soon commence. In Nevada the eastern 101 miles have been let by contract and work proceeds. The remaining 326 miles will be let in December. In California the entire 380 miles have been under contract for a year, and 120 miles of grading have been finished at various parts.

YOUNGSTOWN & OHIO RIVER.—Contracts let to Cleveland Construction Co., of Salem, Ohio, for extending this road from Leetonia, Ohio, to West Point, 14 miles, and from Washington, Ohio, to Leetonia, 1½ miles. The road is projected from West Point to East Liverpool an additional 16 miles.

YREKA RAILWAY.—An officer writes that this company is making preliminary surveys for an extension from Yreka, Cal., to Etina, 40 miles.

RAILROAD CORPORATION NEWS.

ASTORIA & COLUMBIA RIVER.—It is reported from Portland, Ore., that this 110-mile road has been sold to the Hill interests at a price said to be about \$5,000,000.

ATCHISON, TOPEKA & SANTA FE.—In explanation to the Kansas Railroad Commissioners of the uses which the company is to make of its proposed issue of \$98,000,000 bonds or stock, officers of the Santa Fe stated that the company is planning to finish the double track from Kansas City to Chicago, and ballast about 400 miles of track in Kansas. A block-signal system is to be put in on the double-track lines in Kansas, from Kansas City to Newton, counting the Ottawa cut-off as a part of the double-track system in Kansas. One of the plans now under way is a cut-off from Texico, N. Mex., to Brownwood, Texas. This is to be about 300 miles long, connecting with the Pan-handle branch of the system, and when trains are started over the Belen cut-off all freight from California for southern points or for export for Galveston will be diverted over this route instead of being sent around by Newton, Kansas. The survey for the new line has been made and the company expects to begin construction in a short time.

ATLANTIC COAST LINE.—This company has sold \$4,500,000 4 per cent. serial one to ten-year car trust certificates to Brown Brothers & Company.

BALTIMORE & OHIO.—Gross earnings for the six months ended December 31, 1906, were \$41,771,197, an increase of \$3,160,789 over 1905. Net earnings were \$14,943,093, a gain of \$755,353.

BENNINGTON & NORTH ADAMS (ELECTRIC).—The Bennington & Hoosic Valley, an electric road which runs from Bennington, Vt., to Hoosic Falls, control of which was recently bought by the Consolidated Railway, was on January 9 consolidated with the Bennington & North Adams Electric Railroad, the new company having \$650,000 capital stock, and Charles S. Mellen, President of the New York, New Haven & Hartford being President. An extension to Troy, N. Y., is reported to be under consideration.

CAPE BRETON COAL, IRON & RAILWAY COMPANY.—This company, which operates 31 miles of road in Nova Scotia, has defaulted interest on its bonds.

CHICAGO & ALTON.—An issue of \$6,000,000 five-year 5 per cent. notes dated January 1, 1907, has been made. Of this issue \$5,250,000 is to be used for refunding notes maturing next July, and \$750,000 has been sold to Speyer & Company.

CHICAGO & WESTERN INDIANA.—An issue of \$5,000,000, three-year 5 per cent. guaranteed, collateral trust notes has been sold. The funds thus obtained cost the road about 7 per cent. Part of the money is probably needed to cover expenditures for track elevation, which have been heavy during recent years. These notes are being offered at 98 and interest, yielding 5½ per cent.

CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS.—Gross earnings for the year ended December 31, 1906, were \$24,594,900, a gain of over \$2,000,000 over 1905; expenses increased \$1,500,000, leaving a gain of \$5,504,000 in net earnings. The surplus over dividend requirements (5 per cent. on the preferred and 4 per cent. on the common stock) was \$79,800, an increase of \$38,300 over 1905.

CONSOLIDATED RAILWAY.—See Bennington & North Adams.

ERIE.—Application has been made to list \$12,000,000 additional general mortgage 4 per cent. bonds of 1953, series B, on the New York Stock Exchange.

EVANSVILLE & SOUTHERN INDIANA TRACTION.—The Evansville & Southern Indiana Traction Company, recently incorporated with \$4,500,000 capital stock, has taken over the Evansville, Princeton & Vincennes and the Evansville Electric Railway. The Northern Indiana Railway of South Bend, Ind., is reported to

have been acquired in the interest of those in control of the new company.

FORT DODGE, DES MOINES & SOUTHERN (ELECTRIC).—See Newton & Northwestern.

GEORGE'S CREEK & CUMBERLAND.—See Western Maryland.

GREAT NORTHERN.—The Great Northern was on January 23 temporarily enjoined from making its new issue of \$60,000,000 stock.

MACON, DUBLIN & SAVANNAH.—This company, recently bought by the Seaboard Air Line, has filed a mortgage securing \$1,840,000 5 per cent. bonds.

MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE.—A recent estimate of earnings published by this company reflects clearly the recent difficulties of railroad operation in the Northwest. Although gross earnings for the six months and two weeks from July 1, 1906, to January 14, 1907, increased 8 per cent., estimated earnings for the first two weeks of January decreased 22½ per cent., and for the week ended January 14 decreased from \$217,952 in 1906 to \$145,986 in 1907, a falling off of 33 per cent., or approximately one-third.

NEWTON & NORTHWESTERN.—This steam railroad, operating 102 miles of line between Newton, Iowa, and Rockwell City, has made an arrangement with the Fort Dodge, Des Moines & Southern (Electric), by which that road is to have trackage rights over 40 miles of the line of the Newton & Northwestern between Gowrie and Kelley, which has been equipped for electric operation.

NEW YORK CENTRAL LINES.—Gross earnings for the month of December and for the year ended December 31, 1906, are as follows:

December, 1906.			
New York Central & Hudson River....	\$7,752,776.99	Inc.,	\$6,693.52
Lake Shore & Michigan Southern.....	3,562,379.34	Inc.,	13,238.88
Lake Erie & Western	413,053.71	Dec.,	42,183.57
Chicago, Indiana & Southern.....	234,207.92	Inc.,	48,327.57
New York, Chicago & St. Louis.....	930,741.18	Dec.,	48,463.57
Michigan Central	2,311,321.27	Inc.,	285,189.54
Cleve., Cin., Chicago & St. Louis.....	2,169,739.10	Inc.,	127,723.38
Peoria & Western	269,017.57	Dec.,	35,416.21
Cincinnati & Northern.....	82,624.63	Inc.,	7,949.00
Pittsburg & Lake Erie.....	1,129,165.09	Inc.,	13,420.85
Rutland	220,067.62	Inc.,	4,760.38
Year Ended Dec. 31, 1906.			
New York Central & Hudson River....	\$92,089,768.77	Inc.,	\$5,994,166.75
Lake Shore & Michigan Southern.....	42,544,378.93	"	3,943,568.68
Lake Erie & Western	5,212,811.80	"	175,516.95
Chicago, Indiana & Southern.....	2,332,731.74	"	217,687.25
New York, Chicago & St. Louis.....	9,902,208.97	"	793,478.97
Michigan Central	26,275,588.13	"	2,991,719.89
Cleve., Cin., Chicago & St. Louis.....	24,594,915.82	"	2,077,152.56
Peoria & Western	3,059,281.28	"	98,554.36
Cincinnati & Northern.....	1,027,728.00	"	180,498.22
Pittsburg & Lake Erie.....	14,481,495.48	"	1,643,759.65
Rutland	2,799,209.50	"	237,120.74

NEW YORK, NEW HAVEN & HARTFORD.—There have been \$3,000,000 short term notes recently sold in addition to the \$23,000,000 already reported in the *Railroad Gazette*. To this \$26,000,000 is to be added \$40,000,000, which is to be received as payment for an issue of about \$25,000,000 new stock to be offered to shareholders within the next few months at about \$150 per share. Of the total \$66,000,000 of new funds thus obtained, \$21,500,000 will, according to an official statement recently issued, be used for buying new equipment, \$4,000,000 for new steamboats, and about \$20,000,000 for general requirements of the electric lines in Connecticut, Rhode Island and Massachusetts for extensions, improvements, and, in particular, for new equipment; of the balance of \$23,500,000, much is to be used for refunding short term notes maturing in July.

A report from Portland, Me., is to the effect that the New York, New Haven & Hartford, instead of Charles W. Morse, has bought the Maine Steamship Company, which has a line of steamboats running between New York and Portland.

It is reported that the New Haven proposes to spend several million dollars on Boston freight terminals. The Park Square station has been offered to the Boston & Albany at a price said to be \$5,000,000.

See Western Massachusetts (Electric).

NORTHERN PACIFIC.—See Astoria & Columbia River.

PENNSYLVANIA.—The Pennsylvania Railroad has offered to exchange its stock share for share for the common stock of the Philadelphia & Erie which it does not own, or to pay \$136 for each \$100 par in Philadelphia & Erie stock. The proposal will be submitted to the stockholders of the Philadelphia & Erie at the annual meeting on February 11. There is \$7,500,000 common stock, of which the Pennsylvania owns \$3,500,000.

PENNSYLVANIA RAILROAD.—This company has executed 24 leases of \$1,000,000 each with the Pennsylvania Rolling Stock Trust and the Pennsylvania Equipment Improvement Trust to provide for new freight equipment to the number of 19,537 cars. The railroad company is to pay one-tenth of the value of the cars each

year as rental. The Pennsylvania Freight Equipment Trust, with a capital of \$100,000,000, organized last April, has filed articles of incorporation, but has not yet recorded any leases with the Pennsylvania Railroad for new equipment.

PEORIA & PEKIN TERMINAL.—This road is to be sold at foreclosure on February 1. It operates 29 miles of line, by steam for freight, and by electricity for passengers, between Peoria and Pekin, Illinois. It is reported that new securities will be issued to take place of the \$977,000 bonds on which interest was defaulted last year. It is reported that the new securities will be guaranteed by the Chicago & Alton and the Chicago, Rock Island & Pacific jointly. The Rock Island, it is understood, controls half, and the Alton probably the other half of the \$600,000 stock. (Nov. 30, 1906.)

PHILADELPHIA & ERIE.—See Pennsylvania.

PITTSBURG & LAKE ERIE.—A special meeting will be held on February 28 to increase the capital stock from \$10,000,000 to \$30,000,000.

The following table shows the principal statistics of operation for the years ended December 31, 1906 and 1905:

	1906.	1905.
From freight traffic	\$13,051,880.22	\$11,576,738.21
From passenger traffic.....	1,287,565.21	1,137,817.33
Total earnings	\$14,481,495.48	\$12,837,735.83
Expenses of operation	11,193,983.16	9,887,624.14
Net earnings	\$3,287,507.32	\$2,950,111.69
Per cent. of operation	77.30	77.02

PITTSBURG, CINCINNATI, CHICAGO & ST. LOUIS.—Estimated earnings for the year ended December 31, 1906, increased \$2,742,446. Against this operating expenses increased \$2,213,269, leaving an increase of \$529,177 in net earnings. During the month of December net earnings decreased \$175,181.

SEABOARD AIR LINE.—A new mortgage has been authorized to secure \$18,000,000 bonds, of which about \$7,000,000 are to be offered to security holders at 90. A little over \$5,000,000 of this amount is for refunding.

SOUTHERN.—J. P. Morgan & Co. have bought from the Southern Railway \$15,000,000 three-year, 5 per cent. notes, which have all been sold by the bankers at about 97. The funds thus secured probably cost the railroad company between 6½ and 7 per cent., and are being offered to the public to net 6 per cent. on the investment. The proceeds are to be used for general improvements and for new properties previously acquired, expenditures which will ultimately be provided for by the development and general mortgage bonds. Just previous to the announcement of this issue of notes, there was a sharp decline in the market price of the Southern Railway preferred and common stocks.

TOLEDO & WESTERN (ELECTRIC).—This company, which operates 80 miles of line from Toledo to Fayette and Pioneer, with a branch to Adrian, Mich., has been in the hands of a receiver since July 2, 1906. Arrangements have now been made for rehabilitating the company, which is to have \$2,000,000 stock and \$2,000,000 bonds. Of the bonds \$1,250,000 are a first mortgage on the Toledo & Western proper and \$250,000 a first mortgage on the Toledo, Fayette & Western, a subsidiary road, controlling 14 miles of the line. The other bonds are second mortgage bonds on the combined properties.

WESTERN MARYLAND.—The Western Maryland has bought the capital stock of the George's Creek & Cumberland, a coal freight road with about 20 miles of line and 33 miles of track. The George's Creek & Cumberland had a contract under which it delivered most of its freight to the Baltimore & Ohio and the Pennsylvania at Cumberland. This traffic will now go to the Western Maryland. Besides this advantage, the road could be used as part of a connection between the Western Maryland and the Wabash lines. Through the Cumberland Narrows, a narrow gap in the mountains, the Baltimore & Ohio is on one side of the river and the George's Creek & Cumberland is on the other. The Western Maryland secured over 1,000 freight cars as part of the purchase. Of the \$1,000,000 capital stock of the acquired railroad the American Coal Company owned 61 per cent., and the rest was mainly held by other coal companies.

WESTERN MASSACHUSETTS (ELECTRIC).—The management of this road, controlled by the New York, New Haven & Hartford interests, has applied to the Massachusetts Railroad Commission for authority to merge the Western Massachusetts Railway and the Woronoco Street Railway through purchase of the Woronoco company by the Western Massachusetts by exchange of stock at par.

WISCASSET, WATERVILLE & FARMINGTON RAILWAY.—This company has been incorporated with \$100,000 common stock and \$200,000 5 per cent. non-cumulative preferred stock, as successor of the Wiscasset, Waterville & Farmington Railroad sold at foreclosure on December 4, 1906.